

About MTSU

Middle Tennessee State University, a coeducational, tax-supported institution founded in 1911, is located in Murfreesboro less than a mile from the exact geographic center of the state. Murfreesboro, a historic city of over 120,000, is 32 miles southeast of Nashville via I-24 and is easily accessible from any direction. MTSU students and personnel can enjoy the advantages of a metropolitan atmosphere without the impersonalization associated with a big city.

The large and beautifully landscaped campus of approximately 500 acres has more than 200 permanent buildings totaling almost 6.0 million square feet. Visitors may take a virtual tour at tour.mtsu.edu/.

The University is made up of eight undergraduate colleges—the College of Basic and Applied Sciences, the College of Behavioral and Health Sciences, the Jennings A. Jones College of Business, the College of Education, the College of Liberal Arts, the College of Media and Entertainment, the University College, the University Honors College—and a College of Graduate Studies. MTSU offers curricular breadth in a variety of programs ranging from traditional ones on which the school was founded to new, innovative ones designed for a rapidly changing society. Designated a regional university, MTSU provides services and continuing education to the central Tennessee area.

Some 80 percent of the school's more than 950 full-time faculty members hold terminal degrees. The student body numbers more than 22,000 and comes from 94 Tennessee counties, 47 states, and 81 foreign countries.

Statement of Mission

Middle Tennessee State University is a comprehensive university that embraces its role as the destination of choice for Tennessee undergraduates while expanding its reach nationally and internationally through signature programs and select master's and doctoral programs. The University generates, preserves, and disseminates knowledge and innovation and uses scholarship to enhance teaching and public service. The University is committed to preparing students to thrive in their chosen professions and a changing global society.

A major public institution of higher learning, MTSU is a member of the State University and Community College System of Tennessee.

Approved March 25, 2011, by the Tennessee Board of Regents

Purpose

To fulfill its mission, Middle Tennessee State University

- fosters a student-centered environment conducive to lifelong learning, personal development, and success;
- offers a broad array of high quality, affordable academic programs grounded in a common core of arts and sciences;
- enhances access and academic opportunity for a diverse student population, including distance learning and other special services and programs for first generation, non-traditional, high-achieving, and transfer students;
- challenges students through diverse teaching methods and media including educational technology, experiential learning, undergraduate and graduate research, and co-curricular and extra-curricular activities;
- recruits exceptional faculty and develops resources to support excellence in instruction, research, creative activity, and public and professional service;
- develops and sustains academic partnerships, entrepreneurial activities, outreach and public service that support instruction and research and that meet the needs of communities throughout the region; and
- serves as an emerging center for international study, understanding, and exchange.

Middle Tennessee State University educates students to

- think logically, critically, and creatively;
- make sound judgments with an awareness of ethical, moral, and aesthetic values;
- acquire a working knowledge of a discipline or a group of related disciplines;
- examine, analyze, and shape the contemporary world through scientific knowledge, creative undertakings, and an understanding of culture and history;

- communicate clearly and precisely and understand the proper role of free expression in our society; and
- demonstrate the effective and adaptive use of current and/or emerging technologies.

Vision

Middle Tennessee State University will be a vibrant hub for educating accomplished students who are civically engaged and globally responsible citizens; a seedbed for research and entrepreneurship; and an engine of cultural and economic development.

Community Standards

MTSU is committed to developing and nurturing a community devoted to learning, growth, and service. Each person who joins or affiliates with the community does so freely and accepts and practices the following core values and expectations:

- **Honesty and Integrity.** The notions of personal and academic honesty and integrity are central to the existence of the MTSU community. All members of the community will strive to achieve and maintain the highest standards of academic achievement in the classroom and personal and social responsibility on- and off-campus.
- **Respect for Diversity.** The MTSU community is composed of individuals representing different races, ethnicities, sexual orientations, cultures, and ways of thinking. We respect individual differences and unique perspectives and acknowledge our commonalities.
- **Engagement in the Community.** All members of the community are encouraged to participate in educationally purposeful activities that support and enhance the MTSU experience. Active involvement and personal investment in the classroom and throughout the community are hallmarks of an engaged citizen.
- **Commitment to Non-violence.** MTSU is committed to the principles of nonviolence and peaceful conflict resolution. Community members will freely express their ideas and resolve differences using reason and persuasion.

The History of the University

Middle Tennessee State University began as Middle Tennessee State Normal School, opening its doors on Monday, September 11, 1911.

In 1909, the Tennessee General Assembly passed legislation to improve the system of public education by establishing a General Education Fund and creating three normal schools, one in each of the three grand divisions of the state. These institutions were to establish teaching standards or "norms," hence the name. The Murfreesboro school began with four buildings on a dusty site that just a year earlier had been farmland.

Opening with a two-year program for training teachers, Middle Tennessee State Normal School evolved into a four-year teachers college in 1925 with the power of granting the Bachelor of Science degree. In 1943, the General Assembly designated the institution a state college. This new status marked a sharp departure from the founding purpose and opened the way for expanding curricular offerings and programs. In 1965, the institution advanced to university status.

Several significant milestones chart the progress from normal school to university and beyond. During the progressive movement from a two-year normal to a university, several significant milestones may be identified. Responding to the expressed needs of the institution's service area, the Graduate School was established in 1951. The Bachelor of Arts was added that same year. To effect better communications and improve administrative supervision, the schools concept was introduced in 1962.

As MTSU developed and grew, new degree programs included the Doctor of Arts in 1970 and the Specialist in Education in 1974. Library resources dramatically increased, and sophisticated computer services aided instruction and administration. A highly trained faculty enabled the University to continue growth in program offerings. In 1991, the University's six schools-five undergraduate and the graduate school-became colleges. In 1998, MTSU's Honors Program became the Honors College, the first in the state. In 2006, the Division of Continuing Studies and Public Service changed to the College of Continuing Education and Distance Learning. In 2002, approval was granted to redesignate three D.A. programs to Doctor of Philosophy programs, and subsequently five others have been approved. In the 2010 reorganization, Continuing Education and Distance Learning became the University College,

and the College of Education and Behavioral Science became the College of Education and the College of Behavioral and Health Sciences. The Doctor of Education was approved in 2012.

Since 1911, MTSU has graduated more than 100,000 students. Despite the University's growth from a campus of 100 acres, 125 students, and a faculty of 18, to an academic city of over 500 acres, more than 22,000 students, and a faculty of more than 950, the institution is still essentially a "people's university" with a concern for the diverse needs of the area that it serves. In 1986, James McGill Buchanan ('40) became the first MTSU alumnus to be awarded the Nobel Prize. Buchanan received the Nobel Memorial Prize in Economic Sciences for his development of the theory of public choice, a way of studying the expenditure of public funds. In 2011 the University celebrated its Centennial year with the theme "A Tradition of Excellence." As the University looks forward to the next 100 years, the theme is exemplified as everyone in the University community—students, faculty, staff, alumni, and friends—strives to be the best.

Accrediting Agencies and Memberships

Middle Tennessee State University is accredited by the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC) to award baccalaureate, masters, and doctorate degrees. Contact the SACSCOC at 1866 Southern Lane, Decatur, Georgia 30033-4097 or call 404-679-4500 for questions about the accreditation of Middle Tennessee State University.

AACSB International - The Association to Advance Collegiate Schools of Business
ABET, Inc., Computing Accreditation Commission of ABET (<http://www.abet.org>)
ABET, Inc., Engineering Technology Accreditation Commission of ABET (<http://www.abet.org>)
Accreditation Commission for Education in Nursing (ACEN)
Accreditation Council for Education in Nutrition and Dietetics (ACEND)
Accrediting Council on Education in Journalism and Mass Communication - ACEJMC
American Alliance for Health, Physical Education, Recreation and Dance
American Anthropological Association
American Association of Airport Executives
American Association of Colleges and Universities
American Association of Collegiate Registrars and Admissions Officers
American Association of Colleges for Teacher Education
American Association of Colleges of Nursing
American Association of Family and Consumer Sciences
American Association for Leisure and Recreation
American Association of State Colleges and Universities
American Chemical Society
American College Testing Program
American Council on Education
American Historical Association
American Political Science Association
American Society for Biochemistry and Molecular Biology
American Sociological Association
Association for Childhood Education International
Association for Continuing Higher Education
Association for Gerontology in Higher Education (AGHE)
Association of Departments of Foreign Languages

Council on Social Work Education
Council on Undergraduate Research
Fuld Institute for Technology in Nursing Education
Institutional Animal Care and Use Committee
Administrators Association
Learning Resources Network
NASFA - Association of International Educators (National Association of Foreign Student Advisors)
National Air Transportation Association
National Association of Fellowship Advisors (NAFA)
National Association for School Psychologists (NASP)
National Association for Sport and Physical Education
National Association for the Education of Young Children
National Association of Schools of Art and Design
National Association of Schools of Music
National Association of State Universities and Land-Grant Colleges
National Association of Student Personnel Administrators
National Athletic Trainers' Association
National Business Aviation Association
National Collegiate Athletic Association
National Collegiate Honors Council
National Commission for Health Education Credentialing
National Council of University Research Administrators
National Intercollegiate Flight Association
National League of Nurses
National Recreation and Parks Association
North American Colleges and Teachers of Agriculture
ORAU - Oak Ridge Associated Universities, Partnerships for Innovation
Physics Teacher Education Coalition
South Central Local Interagency Coordinating Council
Southern Association for College Student Affairs
Southern Association of Collegiate Registrars and Admissions Officers

Association of Technology, Management, and Applied Engineering (ATMAE)	SREB Council on Collegiate Education for Nursing
Aviation Accreditation Board International	Southern Regional Honors Council
Aviation Technician Education Council	Teacher Education Council of State Colleges and Universities
Certified Family Life Educator (CFLE)	Teachers College Association of Extension and Field Services
CIM National Steering Committee	Tennessee Alliance for Continuing Higher Education
Coalition of Adult Learning Focused Institution (ALFI)	Tennessee Association of Colleges for Teacher Education
Collaborative Institutional Training Initiative	Tennessee Association of Collegiate Registrars and Admissions Officers
Commission on Accreditation of Allied Health Education Programs	Tennessee Association of Science Department Chairs
Commission on Accreditation of Athletic Training Education (CAATE)	Tennessee Association of Veterans Programs Administrators
Commission on Collegiate Nursing Education	Tennessee Conference of Graduate Schools
Conference USA	Tennessee College Association
Consortium for Overseas Student Teaching (COST)	Tennessee Collegiate Honors Council
Council for the Accreditation of Educator Preparation (CAEP)	Tennessee Department of Intellectual and Developmental Disabilities
Council for Accreditation of Counseling to Related Educational Programs (CACREP)	Tennessee Early Intervention System
Council for Adult and Experiential Learning (CAEL)	The College Board
Council for Exceptional Children, Division of Early Childhood	United States Army, Cadet Command
Council for Interior Design Accreditation (CIDA)	University Aviation Association
Council for the Advancement and Support of Education	
Council of Graduate Schools	
Council of Southern Graduate Schools	

Academic Calendar

The calendars listed below are subject to change at any time prior to or during an academic term due to emergencies or causes beyond the reasonable control of the institution, including severe weather, loss of utility services, or orders by federal or state agencies.

Academic Calendar

The academic calendar can be found at www.mtsu.edu/calendar_academic.php. See **2017-18 Academic Calendar** for a pdf version.

In the event of inclement weather, MTSU will disseminate closing plans. See mtsunews.com/weather/ for more information.

Graduate Dates and Deadlines

Important dates and deadlines for graduate students can be found at www.mtsu.edu/graduate/student/calendar.php. **NOTE: Application deadline for particular graduate programs may be earlier. Check individual programs for their deadlines.**

Individual Graduate Program Application Deadlines

For students to be guaranteed consideration for admission into a graduate program, applications must be complete. All required materials must be submitted by the specified date. Incomplete applications will be held until all required materials have been received. Individual programs determine if an applicant's file will be considered for review after the deadline. Applicants who wish to be considered for entry into a program for another term must submit a readmission application for the subsequent term. Submitted materials are retained for twelve (12) months from the original submission.

Please note: Deadlines for application may differ for international and domestic students. Individual program deadlines may also differ from those of the College of Graduate Studies, so check individual programs for their deadlines. Refer to the deadlines both within and following the University Calendar for details. When there are two deadlines stated, the earlier deadline takes precedent for receipt of all application materials at the College of Graduate Studies. Refer to the Glossary of Terms for additional information.

Other Dates and Deadlines

Online schedule/registration guide for registration, fee payment, drop/add, and other important dates can be found at www.mtsu.edu/registration/registration-guide.php.

Final exam schedule can be found at www.mtsu.edu/registration/registration-guide.php.

College of Graduate Studies

The College of Graduate Studies provides academic and other support services, including administration of graduate assistantships and scholarships for graduate students, while upholding academic standards. The college also serves as the central collegiate component for uniting the entire graduate academic community at Middle Tennessee State University. In consultation with the graduate faculty, the college establishes policies and procedures to promote excellence in graduate education. These include processes to ensure judicious and selective graduate student admission decisions, rigorous adherence to the academic standards expected of graduate students, monitoring for excellence in graduate program curricula through the graduate program review process, and selectivity in making graduate faculty appointments. The college certifies that every candidate for conferral of a graduate degree has fulfilled all academic requirements. The college contributes assistance to help ensure that each graduate program provides the optimal educational experiences for its graduate students. This support includes the distribution of graduate assistant funds and the provision of graduate fellowships and scholarships.

Mission

The College of Graduate Studies, in partnership with other academic units at Middle Tennessee State University, regional institutions of higher education, and private and public agencies and corporations, is committed to a leadership role in graduate education. This on-going process will result in the development of the technically skilled, entrepreneurial workforce required for sustaining regional, national, and global economies. This mission will be accomplished through seamless integration of teaching and learning, the outstanding scholarship of the University's faculty and students, continued emphasis on enhanced-quality programs, and development of innovative programs with an interdisciplinary focus.

Vision

The vision of the College of Graduate Studies is to make Middle Tennessee State University a destination of choice for prospective graduate students. This will be accomplished by promoting the highest quality in graduate education, research, scholarship, creativity, innovation, mentoring, and training.

Values

The college values excellence in instruction, research, creative activity, and public service. In pursuit of excellence, we actively foster mentoring and internal and external partnerships. The College of Graduate Studies is committed to the active and timely communication of accurate information throughout the University community and the public at large, the treatment of all materials and information in a confidential manner, and truth in advertising.

The Graduate Council and Graduate Faculty

Graduate Council Mission Statement

The Graduate Council plays a crucial role in the oversight and planning of all MTSU graduate courses and graduate degree programs, in establishing criteria for the appointment and reappointment of graduate faculty, in assessing graduate student issues and concerns, and in recommending to the dean of the College of Graduate Studies University-wide policies and procedures for implementation. The Graduate Council advises in the modification of existing programs and in the approval and implementation of any new programs. All student activities leading to advanced degrees proceed under policies and regulations established and reviewed by academic programs, the Graduate Council, and the College of Graduate Studies.

The Graduate Council provides leadership in the pursuit of excellence in scholarly activity and serves as an advocate in obtaining resources for graduate programs. Only full-time MTSU faculty holding membership on the graduate faculty may serve on the Graduate Council. Council members are appointed by the president to serve three-year terms with three representatives per college. Two graduate student representatives who meet all graduate academic standards are also appointed. To ensure continuity and institutional memory in the creation and implementation of policies and procedures, one third of the council members rotate off each year and are replaced by six new faculty members representing each college. Graduate students are appointed to the council each academic year, and the graduate college dean, associate graduate college dean, and the six academic deans serve as ex officio members. The vice chair, who conducts meetings in the absence of the chair and who serves as chair-elect, is elected annually. The chair, in consultation with the dean of the College of Graduate Studies, is responsible for setting the council's agenda.

Graduate Faculty Membership

Only graduate faculty members are eligible to teach 5000/6000/7000-level courses and serve on thesis or dissertation committees. Full members are eligible to serve as thesis committee chairs.

Adjunct Membership

This category applies to part-time adjunct faculty and individuals who are not MTSU faculty members but have specific expertise pertinent to graduate programs. The period of appointment is three years and may be renewed in accordance with Graduate Council criteria. Adjunct members may not direct a doctoral dissertation or a master's thesis but may serve as a committee member/reader. These members are not listed in the graduate catalog. Adjunct faculty membership means that the individual

- holds the terminal degree in the field(s);
- has provided evidence of qualifications to execute assignments successfully;
- has been recommended by the department chair, the college dean, and Graduate Council; and
- has been approved by the dean of the College of Graduate Studies.

Graduate Faculty Listing

A complete listing of current graduate faculty members can be found at www.mtsu.edu/graduate/faculty/gradfaculty.php.

Admission to the College of Graduate Studies

General Admissions Policies

The University welcomes applications from individuals qualified for graduate study. An applicant initially applies to the College of Graduate Studies. Upon receipt of all required materials and assuming the applicant meets the admission standards of the College of Graduate Studies, applications for degree-seeking students are then forwarded to the individual program for consideration. Applications for admission should be completed online (www.mtsu.edu/graduate/apply.php). In accepting admission to the College of Graduate Studies, a graduate student assumes responsibility for knowing and complying with the regulations and procedures set forth in this catalog as well as any amendments or revisions that may ensue.

Graduate applicants must have earned a bachelor's degree, although for some programs a master's degree is required for admission. Under certain conditions undergraduate seniors with 98 semester hours of credit may be eligible to take graduate coursework. (See the section on **Eligibility to Enroll in Graduate Courses** below.)

Applicants admitted to graduate programs as **degree-seeking students** are those working toward a graduate degree. Degree-seeking students must be recommended for admission by the graduate program/department and approved by the dean of the College of Graduate Studies.

Students not seeking a degree are classified as **non-degree-seeking students**. Except for those interested in teaching licensure or master's +30, non-degree-seeking students must be admitted to the College of Graduate Studies. They are not admitted into a specific program. Non-degree-seeking students may take classes not restricted to students admitted into specific programs. Non-degree-seeking students may take courses for a reasonable period of time as determined by the dean of the College of Graduate Studies and are not eligible for financial aid.

NOTE: Non-degree-seeking students are not permitted to enroll in graduate courses in the Jennings A. Jones College of Business.

Students interested in obtaining a teaching license or working on master's +30 hours should apply for admission to either the Initial Licensing Track or the Master's +30 Track.

All applicants to the College of Graduate Studies must have an overall undergraduate grade point average (GPA) of 2.75 (on a 4.00 scale) to be **considered** for unconditional admission. (Also see conditional admission.) Applicants who attended graduate school at another institution must have a minimum cumulative GPA of 3.00 on all graduate work and a minimum of 2.75 on all undergraduate work to be considered for unconditional admission. International students on an F1 visa must meet requirements for unconditional admission.

Individual programs may have higher admission requirements than those of the College of Graduate Studies.

Applicants should consult the programs for individual program admission requirements.

The College of Graduate Studies notifies all students of formal admission to both the College of Graduate Studies and to individual graduate programs. Students pursuing a graduate degree must be fully admitted to the program prior their initial semester of coursework.

Admission as a Degree-Seeking Student

All applicants wishing to pursue a graduate degree objective at MTSU **must** formally apply for admission to the College of Graduate Studies as degree-seeking students.

All degree-seeking applicants should submit the following materials to the College of Graduate Studies at least three months prior to the anticipated date of registration:

1. an application for admission, preferably submitted online (www.mtsu.edu/graduate/apply.php);
2. a nonrefundable application and processing fee (required of all applicants) should accompany the application (applications are NOT processed until the fee is paid);
3. official transcripts certifying coursework from each college or university attended. Official transcripts must be mailed directly from the institution to MTSU and must be received prior to completion of the first semester of enrollment, except for the M.B.A. for which all transcripts must be received prior to enrollment. Unofficial transcripts may be used for the initial registration in graduate courses as a demonstration of eligibility for graduate status.
 - a. If the applicant obtained the bachelor's degree at MTSU, only transcripts of work not posted on the MTSU transcript will be required.

- b. If the applicant obtained the bachelor's degree at another institution, that latter transcript is required. Transcripts of work not posted on the baccalaureate transcript are also required. All post-baccalaureate transcripts are also required.
 - c. If the applicant earned a graduate degree at another institution, that latter transcript is also required. Transcripts of all post-baccalaureate work not appearing on the graduate transcript are also required.
 - d. For international applicants, official or attested university records, with certified translations (if the records are not in English) are required. Notarized copies are not acceptable.
 - e. Any applicant whose highest degree is from a university outside the United States may be required to have his or her credentials evaluated by an acceptable evaluation service. A course-by-course report is required. All acceptable evaluation services are also listed at www.naces.org/members.htm.
4. letters of reference, supplemental applications, resumes, and portfolios may be required by the graduate program and should be submitted to the College of Graduate Studies. Please refer to the relevant graduate program information section of this catalog to determine if additional application materials are required.
 5. satisfactory official scores on the Graduate Record Examination (GRE), Miller Analogies Test (MAT), or Graduate Management Admissions Test (GMAT) tests. The GRE, MAT, or GMAT result is used in the evaluation of the academic qualifications of all graduate applicants. However, admission decisions will be based on the overall academic record of the applicant (particularly in comparison with other applicants being accepted into the program), as well as other relevant materials such as letters of recommendation.

NOTE: Both ETS and the GRE Board have advised that a combined GRE score should not be used as an absolute cutoff for admissions decisions but rather should be used as part of an overall evaluation of applicants. The GRE Board statement reads: "A cutoff score based only on GRE scores should never be used as a sole criterion for denial of admission." The College of Graduate Studies subscribes to this principle.

International students who will be attending the University on a visa and who are not native speakers of English or graduates of a United States undergraduate or graduate institution must submit a Test of English as a Foreign Language (TOEFL) score (minimum score of 525 paper-based or 71 Internet-based), Michigan English Language Assessment Battery (MELAB) test score (minimum score of 74), International English Language Testing System (IELTS) score (minimum score of 6.0), PTE Academic (minimum score of 55, International Test of English Proficiency (iTEP) score (minimum score of 4.5), E.L.S. instruction (completion of level 112), or International English Institute (IEI) instruction (completion of level 6 in all course areas offered) as a demonstration of English proficiency in order to be admitted to graduate studies at MTSU. Note that certain programs may require higher standards, so please consult the program coordinator for more information.

For information on TOEFL testing, visit www.ets.org/toefl.

For information on MELAB testing, visit www.CambridgeMichigan.org.

For information on IELTS testing, visit www.ielts.org/contact_us.aspx.

For information on PTE Academic, visit www.pearsonpte.com.

For information on iTEP testing, visit www.itepexam.com/.

For information on E.L.S., visit www.els.edu.

For information on IEL, visit www.iei.edu.

International applicants on F and J visas must provide verification of financial support prior to admission as required by the United States Immigration and Naturalization Service. An affidavit of support is not required for admission; however, international students (F1) requiring issuance of Form I-20 must supply sufficient evidence of financial support for the applicant and all members of his/her family requiring issuance of dependent Form I-20. Further information may be obtained from the Office of International Affairs at www.mtsu.edu/intered/.

Undocumented aliens may be admitted to MTSU as out-of-state students and are not eligible for federal financial aid. Each graduate program may have additional requirements including application deadlines. Applicants should refer to the section of this catalog entitled Graduate Program Information, peruse the graduate program description in this catalog, and/or contact the graduate program director in the relevant program for specific requirements. In general, applicants may not apply more than 6 credit hours taken while in non-degree seeking status toward any degree program. Upon notification of admission by the College of Graduate Studies to a specific graduate program, the admitted student should contact the graduate program director for information on any required prerequisite courses. It is advisable to speak with a departmental academic advisor before enrolling in any graduate course.

An applicant not meeting University or program requirements for admission as a degree-seeking student may appeal to the individual program for special consideration. If recommended for admission by the program, the dean of the College of Graduate Studies has final approval or denial authority.

If an applicant fails to meet the deadline for submitting all materials for admission, it will be necessary for the applicant to reapply for admission. All materials submitted will be retained for one year from the date of submission. Students pursuing a graduate degree must be fully admitted to the program prior to their initial semester of coursework.

Admission as a Non-Degree-Seeking Student

Non-degree-seeking student admission is available to qualified applicants who wish to enhance their post-baccalaureate education but do not seek a graduate degree. International students on an F1 visa may not be admitted to graduate study as non-degree-seeking students and are not eligible for financial aid. Applicants wishing to be admitted as non-degree-seeking graduate students must

1. complete an application for graduate admission to the College of Graduate Studies (www.mtsu.edu/graduate/apply.php);
2. pay the non-refundable application fee;
3. submit an official transcript certifying receipt of the bachelor's or post-baccalaureate degree. Official transcripts must be mailed directly from the institution to MTSU and must be received prior to completion of the first semester of enrollment. Unofficial transcripts may be used for the initial registration in graduate courses as a demonstration of eligibility for graduate status.

Not all courses offered at the University are available for non-degree-seeking students. Enrollment in specific courses may be limited to degree-seeking students only. Information concerning eligibility for specific graduate courses may be obtained from individual departments. It is advisable to speak with a departmental academic advisor before enrolling in any graduate course.

NOTE: *Non-degree-seeking students are not permitted to enroll in graduate courses in the Jennings A. Jones College of Business.*

Non-degree-seeking students who wish to change to degree-seeking status must meet College of Graduate Studies' admission requirements and specific graduate program admission requirements to be eligible for consideration. If transfer to degree-seeking status is approved, appropriate semester hours earned while a non-degree-seeking student may be applied toward a degree program if approved by the graduate program director and the dean of the College of Graduate Studies.

Conditional Admission

Occasionally degree-seeking applicants may not meet all the requirements necessary to be recommended for unconditional admission. For example, they may have a low undergraduate grade point average or have low test scores. However, the overall application materials may suggest there is substantial potential for academic success, thus making outright denial counterproductive. In these cases, conditional admission into the College of Graduate Studies may be granted by the dean of the College of Graduate Studies upon the recommendation of the graduate program. Continuation as a degree-seeking student within an individual academic program is contingent upon fulfilling specific requirements stipulated at the time of admission. Monitoring of any conditions is the responsibility of the program. Conditionally admitted students are not eligible to hold graduate assistantships until all conditions of admission are satisfied.

Admission of MTSU Faculty Members and/or Administrators

Members of the faculty and/or administration of MTSU are eligible for admission to the College of Graduate Studies just as any other applicant. They may not take over 6 semester hours of coursework during any semester. Faculty at the rank of assistant professor or higher or administrators of equivalent ranks may not be admitted to any doctoral program. If instructors who are in a doctoral program are appointed to assistant professor rank, they must discontinue the doctoral program.

Misrepresentation of Academic Credentials

It is a Class A misdemeanor to misrepresent academic credentials. A person commits the offense of misrepresentation of academic credentials who, knowing that the statement is false and with the intent to gain admission to MTSU, represents orally or in writing that such person has

1. successfully completed the required work and has been awarded one or more degrees or diplomas from an accredited institution of higher education;
2. successfully completed the required coursework and has been awarded one or more degrees or diplomas from a particular institution of higher education; or
3. successfully completed the required coursework for and has been awarded one or more degrees or diplomas in a particular field or specialty from an accredited institution of higher education.

Any applicant who misrepresents his or her credentials will be subject to disciplinary action from the University which may include dismissal from the University.

Eligibility to Enroll in Graduate Courses

Ordinarily only graduate students should register for courses numbered 5000 or above. However, any MTSU undergraduate student having completed 98 semester hours of undergraduate credit is eligible to take graduate courses, except in Business Administration, Accounting, English, and Information Systems. (This does not pertain to ABM students.)

Undergraduate students wishing to take graduate courses must obtain permission from the graduate program and the College of Graduate Studies. Permission is not guaranteed. Not all graduate courses are offered to undergraduate students. If courses are taken for graduate credit while an undergraduate, they may be applied toward a graduate degree at the discretion of the individual graduate program if the earned credit is not used toward the granting of another degree. Undergraduates admitted to an approved Accelerated Bachelor's/Master's (ABM) program are permitted to apply a limited number of graduate courses taken while an undergraduate to their undergraduate degree as well as to the master's degree.

Students may not enroll in 7000-level courses in the Department of Elementary and Special Education and Womack Educational Leadership Department unless they are seeking an Education Specialist or doctoral degree. Non-degree-seeking students are not permitted to enroll in 7000-level courses.

Accelerated Bachelor's to Master's (ABM) Program

Well prepared students (minimum GPA of 3.25 and having completed 75 hours of undergraduate coursework) are eligible to be part of the Accelerated Bachelor's to Master's (ABM) program at MTSU. These students will be able to complete their Bachelor's degree requirement of 120 hours and their Master's degree requirement (30-36 hours depending upon program) in five years while using up to 12 hours of coursework to fulfill the requirements of both degrees. Programs are currently available in Information Systems, Actuarial Sciences, Biostatistics, Economics, Chemistry, Foreign Languages and Literatures, International Affairs, Exercise Science, Leisure and Sports Management, Criminal Justice Administration, and Computer Science.

Other Admissions Information

Auditing Courses

A student who chooses to audit a course is one who enrolls and participates in a course without expecting to receive academic credit. The same registration procedure is followed and the same fees charged as for courses taken for credit. An audited course is not applicable to any degree or certificate.

Regular class attendance is expected of an auditor. Students interested in auditing a course should discuss course requirements with the instructor prior to enrolling. Failure to meet course requirements may result in an auditor being removed from the course at the request of the instructor. A successful audit will be recorded on the transcript with the designation NC. Any petition to change from audit to credit or credit to audit must be processed by the last day in the semester in which a class may be added to the student's schedule of classes. Requests to change from credit to audit after the deadlines must be approved by the dean of the College of Graduate Studies.

Catalog

This catalog is produced for the convenience and benefit of graduate applicants and enrollees and is revised yearly. After the catalog is published, changes in University and/or graduate program requirements may be approved that apply to new applicants or admittees. Thus the information contained herein should not be construed as binding or inferred as an academic contract. New graduate students should request a copy of graduate program requirements in existence at the time of matriculation. These will be the requirements that must be fulfilled to obtain the degree. Notwithstanding, should graduate requirements change while a student is still enrolled, he/she will have the choice of opting for the new requirements or following the original plan in existence at matriculation, subject to any necessary substitutions. Students who fail to maintain continuous enrollment will need to meet current standards for readmission. Students are also encouraged to consult the departmental/program graduate student handbook in the specific program of study.

Hours Before and After the Master's Degree for Teachers

Teachers may count graduate credit received toward the next pay raise, depending upon policies of their Local Education Agency (LEA). No credit will be given for repeated work. The student must request the Office of Teacher Licensure to send proper credentials to the State Department of Education and/or to the applicable local officials. The student is responsible for maintaining current knowledge of which graduate courses and hours are acceptable for licensure.

Immunizations and Health Certificates

Hepatitis B and Meningococcal Meningitis Acknowledgment

The State of Tennessee mandates that each public or private postsecondary institution in the state provide information concerning hepatitis B and meningococcal meningitis to all students entering the institution for the first time. New students must acknowledge that they have read this information before they can register for classes. This information and acknowledgment statement are automatically displayed when new students register for classes on RaiderNet via PipelineMT. If the student is under age 18, a parent or legal guardian is required to sign the form that is linked to the page and return it to Health Services before registration will be allowed.

All students under age 22 who are enrolling at MTSU for the first time regardless of the level at which the student is matriculating AND who will be living in on-campus housing, must show proof of adequate immunization against meningitis prior to assignment. "Adequate Immunization" means students must have been vaccinated on or after their 16th birthday. On move-in day, those students who have not previously provided such proof must provide it before they can be allowed to move in. For more information, access www.mtsu.edu/healthservices/immunizations.php.

Measles Immunization

Effective July 1, 1998, the State of Tennessee requires students entering colleges, universities, and technical institutes with enrollment of greater than 200 students to provide proof of two (2) doses of measles, mumps, and rubella (MMR) vaccine on or after the first birthday, or proof of immunity to measles if date of birth is 1957 or after. Students will not be allowed to register for full-time classes until an acceptable form is on file in the Student Health Services Office. More information can be obtained by contacting Student Health Services, 898-2988, or by visiting www.mtsu.edu/healthservices/Immunizations.php.

Varicella (chicken pox) Immunization

Effective July 1, 2011, the State of Tennessee requires new full-time enrollees in higher education institutions with enrollments larger than 200 students to provide proof of two (2) doses of Varicella vaccine on or after the first birthday, history of chickenpox illness diagnosed by a healthcare provider or verified by a physician, advanced practice nurse or physician assistant to whom the illness is described, or proof of immunity to Varicella if date of birth is 1980 or after. Students will not be allowed to register full-time for classes until an acceptable form is on file in the Student Health Services Office. More information can be obtained by contacting Student Health Services, 898-2988, or by visiting www.mtsu.edu/healthservices/Immunizations.php.

Readmission (Reenrollment)

The College of Graduate Studies should be contacted for all matters concerning readmission. A previously enrolled student may reapply online on our website (www.mtsu.edu/graduate/apply.php). A readmission application is required from any student who missed one or more semesters (excluding summers), regardless of the reason. For non-degree-seeking post-baccalaureate students, readmission is granted at the discretion of the graduate dean and is subject to space limitations with degree-seeking students given preference for enrollment.

For degree-seeking students, each graduate program may have a specific readmission policy and should be contacted for information. Readmission requires the recommendation of the graduate program and approval by the dean of the College of Graduate Studies. Some graduate programs regularly allow readmission for individuals who have missed no more than one semester or if the "stop-out" period is less than one year; others are more restrictive due to program capacity, curriculum, and ongoing quality improvement. Students seeking to be readmitted must meet the requirements of new applicants.

Registration

The registration guide contains information concerning registration procedures. The most current information regarding registration and availability of courses will be found online on RaiderNet at www.mtsu.edu/registration/registration-guide.php.

Student Identification Cards

All students must have a permanent ID card with a magnetic strip on the back. The card is required for a variety of services on campus including cashing checks, admission to athletic and special events, admittance to the Recreation Center, checking out library materials, obtaining meal tickets, and using RAIDER FUND\$. The ID card will be validated automatically when all fees are paid.

The first card is issued at no charge; however, there is a \$10 charge for replacing lost or stolen IDs. If the card breaks or is damaged, it should be returned to the ID office and a new card will be issued at no charge.

International Graduate Admissions

The College of Graduate Studies (CGS) will process all information regarding application to the University and immigration status. The University provides immigration advisement through Designated School Officials (DSOs) located within CGS. The DSOs are responsible for issuing I-20 and DS-2019 documents used for securing F and J visas. They serve as liaisons among faculty members, administrators, and international students. To expedite the processing of your file, please review the information listed below and the information found at www.mtsu.edu/graduate/international.php.

Admission

An applicant applies to the College of Graduate Studies, and the complete application is forwarded to the individual program for consideration upon receipt of all application materials. The College of Graduate Studies is responsible for the admission of all graduate students to the University. International applicants must meet the admission standards for the College of Graduate Studies and be admitted to an individual graduate program. All inquiries and correspondence regarding admission should be addressed to the College of Graduate Studies. Application information including forms, requirements, and instructions may be obtained by contacting the college or at www.mtsu.edu/graduate.

The College of Graduate Studies requires official university records submitted in a sealed and stamped envelope. For records not in English, certified translations are also required. Notarized copies are not acceptable. International applicants with degrees from outside the United States may be required to have their credentials evaluated by an acceptable evaluation service. A list of acceptable evaluation services is listed on the College of Graduate Studies website (www.mtsu.edu/graduate/international.php). The MTSU Graduate Catalog is available online only. Applicants residing outside the United States at the time of application can apply for admission for the Fall and Spring semesters only. Applicants who are already in the United States and in F1 or J1 status may also apply for Summer, depending on the availability of summer courses in the graduate program.

Application to MTSU

International Applicants

1. complete graduate application for admission (www.mtsu.edu/graduate/apply.php); online applications are preferred.
2. submit **\$35 nonrefundable application fee** (money order or check with routing numbers); American Express, Visa and MasterCard are accepted for online applications.
3. submit proof of English language proficiency: official TOEFL (paper-based minimum score 525 or Internet-based minimum score 71), UMELI (minimum score 85), IELTS (minimum score 6), or E.L.S. level 112. TOEFL scores must be submitted directly from ETS (use institution code 1466).
4. submit a copy of valid passport.
5. if already in the U.S., submit a copy of valid Visa.
6. submit official transcripts from all post-secondary institution(s). We request transcripts be sent directly to an accredited external evaluation service. If transcripts are written in a foreign language, an official translation in English is required in addition to the official original copy. Students seeking transfer credit must obtain the approval of their academic department and submit copies of course syllabi from the transferring institution.
7. submit official GRE or GMAT score. We can only accept GRE copies if our ETS institution code (1466) is listed as a score recipient. Student should select the school codes based on the following: ETS/GRE - 1466; Pearson/GMAT - 6ZR-KJ-25 (M.B.A.-full time), 6ZR-KJ-52 (M.B.A. - part time), 6ZR-KJ-63 (Accounting), 6ZR-KJ-37 (Information Systems).
8. submit a financial statement demonstrating resources sufficient to cover expenses to study at MTSU.
9. submit evidence of two measles, mumps, and rubeola (MMR) and varicella (chickenpox) vaccinations. Applicants should consult the MTSU Student Health Services website for current information on immunization requirements (www.mtsu.edu/health_services).
10. submit evidence of freedom from tuberculosis. Forms are located on the College of Graduate Studies website.

NOTE: Applying online will expedite the processing of the application. In the event that a paper application is used, sending all documents except transcript(s) and test scores in one envelope will expedite processing of

the application. The University will assign a student ID number for record-keeping purposes only. The student ID number should be on all correspondence sent to the College of Graduate Studies. All materials received become the property of MTSU and cannot be returned to the student or forwarded to a third party.

Financial Aid

International students possessing F1 or J1 status must provide verification of financial support prior to issuance of an I-20 as required by the United States Citizenship and Immigration Services (USCIS). Information and appropriate forms are available in the international students section of the CGS website at www.mtsu.edu/graduate/international.php.

Priority Dates for Completed* Files

Fall semester: June 1 of same year; **Spring semester:** October 1 of previous year; **Summer semester:** March 1 of same year. (Applications received after these dates will be reviewed on a case-by-case basis.) Based on time requirements to obtain the necessary documentation, international applicants are encouraged to apply four months or more before the beginning of classes.

***NOTE: A completed file contains ALL materials required for admission.**

Health and Accident Insurance

All international students with F1 or J1 status must obtain and present evidence of comprehensive health and accident insurance as a condition of admission and continued enrollment at MTSU. We recommend international students purchase insurance through MTSU's designated provider shortly before matriculation.

Immigration

It is the student's responsibility to see that he/she possesses legal immigration status. All immigration documents should be kept in a safe place. According to U.S. Citizenship and Immigration Services (USCIS), F1 and J1 students must be enrolled full time (minimum 9 hours) during Fall and Spring semesters. Summer enrollment is optional, unless it is the first term of enrollment. Also, USCIS requires that F1 and J1 applicants meet all admission requirements prior to the first date of enrollment. No conditional enrollment is possible.

Orientation Information

All F1 students must attend a College of Graduate Studies orientation which is held shortly before the beginning of classes each Fall and Spring. Information regarding orientation requirements is sent once the student has received final acceptance into the University and program of study. Any F1 students admitted for the summer term will be required to complete orientation requirements as instructed.

Proof of English Proficiency

International students who will be attending the University on a visa and who are not native speakers of English or graduates of a United States undergraduate or graduate institution must submit a Test of English as a Foreign Language (TOEFL) score (minimum score of 525 paper-based or 71 Internet-based), Michigan English Language Assessment Battery (MELAB) test score (minimum score of 74), International English Language Testing System (IELTS) score (minimum score of 6.5), PTE Academic (minimum score of 55), International Test of English Proficiency (iTEP) score (minimum score of 4.5), E.L.S. instruction (completion of level 112), or international English Institute (IEI) instruction (completion of Level 6 in all course areas offered) as demonstration of English proficiency in order to be admitted to graduate studies at MTSU. Note that certain programs may require higher standards, so please consult the program coordinator for more information.

For information on TOEFL, visit www.ets.org/toefl.

For information on MELAB testing, visit www.CambridgeMichigan.org.

For information on IELTS testing, visit www.ielts.org/contact_us.aspx.

For information on PTE Academic, visit www.pearsonpte.com.

For information on iTEP testing, visit www.iTEPexam.com

For information on E.L.S., visit www.els.edu/en.

For information on IEI, visit www.iei.edu.

Residency Classification for Fee-Paying Purposes

The College of Graduate Studies determines residency for international students. All international students will be considered out-of-state for fee-paying purposes until they apply for and receive in-state status. Those who believe they meet the in-state criteria may obtain an application and submit it to CGS. The completed form and supporting documentation should be submitted at minimum one month prior to the start of the term. Failure to file for residency may result in student payment of out-of-state tuition. Students will be informed of the residency decision by mail. Students holding F or J visas do not qualify for in-state classification.

Expenses/Tuition and Financial Aid

Expenses

The question of costs while attending the University is important to every student. It is difficult, however, to accurately estimate yearly expenditures; expenses vary according to the nature of the curriculum, the place of residence (whether in-state or out-of-state), and the student's own habits and needs. It is possible to live simply and to participate in the life of the student community on a modest budget. The best help the University can offer the student in budget planning is to provide available figures for expenses.

Health service and admission to athletic events are available to any currently enrolled student. The payment of the appropriate fees will permit any combination of graduate and undergraduate courses to be taken that may be required or approved. Charges for all coursework will be assessed by student level. The University reserves the right to correct errors in student fee assessments and charges which are discovered subsequent to initial billings and fee statements.

All fees are for the academic year and are subject to change by action of the Board of Trustees. The new fee amounts will be published each year when approved by the Board of Trustees (usually around July 1).

Registration Fees

Information on fees and deadlines can be found on the Bursar's website: www.mtsu.edu/tuition.

Late Registration

Students who complete registration (including the payment of fees) during the late registration period will be charged a \$100 late fee.

Matriculation Fee for Incompletes

If a student receives a grade of Incomplete (I), he or she need not reregister or pay fees for the course every semester until the course is completed. Such students should work only with the course instructor to complete grade requirements.

Returned Checks

Acknowledged bank errors excepted, a \$30 service charge will be assessed for each returned check (including web check payments). The University will decline to accept checks from any student who has checks returned by the bank more than once or if any check returned is not paid within ten (10) working days. A \$100 late registration fee may be assessed for any returned check given in payment of registration fees and class schedule is subject to be deleted for nonpayment of fees.

Automobiles

All privately owned or operated vehicles for use on the campus must be registered annually with Parking and Transportation Services and must display an official registration permit. For more information or clarification, please refer to **Traffic and Parking Regulations**, available in the Parking and Transportation Services Office.

Auditing Charges

An auditor is one who enrolls and participates in a course without expectation of receiving academic credit. The same registration procedure is followed and the same fees charged as for courses taken for credit. An audited course is not applicable to any degree or certification program.

Regular class attendance is expected. Other course requirements, which may be obtained in writing from the instructor, will vary depending upon the nature of the course. Students interested in auditing a course should discuss course requirements prior to enrolling. Failure to meet course requirements may result in removal from the course at the request of the instructor. A successful audit will be recorded on the transcript with the designation NC.

A change from audit to credit or credit to audit must be processed by the last day to add a class.

Persons 60 years of age or older or disabled persons suffering from a permanent total disability which totally incapacitates such persons from working at an occupation which results in an income (T.C.A., Section 49-7-113) who are domiciled in Tennessee may audit courses at any state-supported college or university without paying tuition charges. (Note: The student must pay an application fee and special course fees.) Registration under this program is on a space-available basis; therefore, students cannot priority register. **Class selection should be processed no earlier than four weeks prior to the start of term or part-of-term (see Registration Guide for date of registration).** Students who priority register or receive a closed class override prior to the published registration date will be required to select another class. Proof of age or disability must be provided.

65-Year-Old/Disabled Credit Student

Persons 65 years of age or older or disabled persons suffering from a permanent total disability which totally incapacitates such persons from working at an occupation which results in an income (T.C.A., Section 49-7-113) who are domiciled in Tennessee may register for classes for credit by paying a service fee not to exceed \$70 per semester. (Note: This fee includes maintenance fees, student activity fees, technology access fees, and registration fees; it does not preclude an application, late fee, change-of-course fee, parking fee, special course fee, etc.) Registration under this program is on a space-available basis; therefore, students cannot priority register. **Class selection should be processed no earlier than four weeks prior to the start of term or part-of-term (see Registration Guide for date of registration).** Students who priority register or receive a closed class override prior to the published registration date will be required to select another class. No late fee is charged. An application fee is required. In addition, the applicant must be eligible for admission and submit proof of age or disability.

Additional Charges

The University reserves the right to increase the charges listed herein or to add new ones whenever such increases or additions are found to be necessary.

Board

All freshman men and women living in the residence halls during Fall and Spring semesters will be required to participate in a freshman meal plan. All other students may secure meals in the University cafeterias or grill either through optional meal plans available from the food service or a meal-to-meal cash basis.

Debts

An important part of every student's educational experience is learning to manage money and to responsibly discharge financial obligations incurred. With this in mind, MTSU expects you to promptly pay all University bills and accounts when due.

Failure to meet financial obligations will result in your not being allowed to preregister, register, or receive transcripts, grade reports, or diplomas. In addition, any unpaid accounts are subject to be turned over to a collection agency which will adversely affect your credit rating.

Installment Payment Plan

Students who want to use the Installment Payment Plan must sign up for the payment plan and pay the down payment online via RaiderNet. If a student is eligible, there will be an option in the bill payment system to request a Installment Payment Plan. Students who wish to pay by mail must view the down payment amount online by selecting the option to view the payment plan installments. Students may also sign up for the plan and pay the down payment at the Business Office cashier windows.

Although all charges are due and payable in full at the beginning of each term, students in good financial standing at MTSU may defer payment of up to 75 percent of their registration, housing, and freshman meal plan fees for the Fall and Spring semesters. The Installment Payment Plan is not available for Summer terms.

To be eligible for the Installment Payment Plan, each participant must make a minimum down payment of 25 percent of the registration fees, residence hall rent, and freshman meal plan costs. The balance due must be \$400 or more after all discounts, waivers, financial aid, and other credits are applied. A student who fails to make timely payments in a previous term will be denied the right to participate in the Installment Payment Plan in future enrollment periods.

Any student who makes payment with a check which is subsequently returned will be denied participation in the Installment Payment Plan in all future terms.

The amount deferred will be payable in three monthly installments. For the Fall term, installment payments are due on or before **September 30, October 31, and November 30**. For the Spring term, installment payments are due on or before **February 28, March 31, and April 30**. The University is not obligated to send reminder notices before the payment is due. Participants in this plan must apply all discounts, waivers, credits, and financial aid (including student loans) toward payment of registration fees before a deferment will be considered. Financial aid and other credits received after the initial payment will be applied to the remaining balance, and future amounts due will be recomputed. No refunds can be made until all fees are paid in full. Students will not be withdrawn for failure to pay the second, third, or fourth payments.

Each participant will be charged a \$50 nonrefundable service fee each term to defray administrative costs. This fee is payable along with the 25 percent down payment on or before the registration fee payment deadline. An additional late payment charge of \$25 will be assessed for each installment not paid on or before the due date and each 30-day period past the last installment up to a maximum of \$100. Withdrawals from classes will not alter the remaining balance due except to the extent that any refund may be applied. Students who make payments with checks that are returned will be charged a \$30 return check service fee as well as any applicable late fees.

If a payment is not received in the Business Office by the scheduled payment due date, the University will withhold all services from the student-including grades, transcripts, and future registration-until the fees have been paid in full including any assessed late fees.

All existing rules and policies pertaining to returned checks, refunds, withdrawals, dropped classes, and collection costs are applicable to the Installment Payment Plan.

Payment of the minimum amount due on the Installment Payment Plan finalizes registration. The class schedule will not be dropped. It is not necessary to also confirm on RaiderNet. The Installment Payment Plan service fee, late fee, and minimum amount are subject to change in future terms.

Additional fees for classes, dorms, or meal plans added after initial registration payment or confirmation must be paid by the late registration fee payment deadline. If students are eligible for the Installment Payment Plan, any unpaid fees after this date will be processed as a deferred payment. The \$50 Installment Payment Plan service charge and any applicable \$25 late payment fees will be charged.

Students who are not eligible for the payment plan will be subject to withdrawal from all classes or from the dorm for nonpayment or subject to service charges and late payment fees.

For more information and detailed instructions on how to sign up for the Installment Payment Plan, check online at www.mtsu.edu/tuition/payment-plan.php. Questions regarding the Installment Payment Plan should be directed to the MT One Stop at (615) 898-2111.

Deferred Payment for Recipients of Veterans Affairs or Other Governmentally Funded Educational Assistance Benefits

Service members, veterans, and dependents of veterans who are eligible beneficiaries of U.S. Department of Veterans Affairs educational benefits or other governmentally funded educational assistance, subject to the conditions and guidelines set forth in Tennessee Code Annotated 49-7-104 as amended, may elect, upon formal application, to defer payment of required tuition and fees until the student's monetary benefits have been received or until the final day of the term for which the deferment has been requested. Application for the deferment must be made no later than 14 days after the beginning of the term, and the amount of the deferment shall not exceed the total monetary benefits to be received for the term. Students who have been granted deferments are expected to make timely payments on their outstanding tuition and fees balance once educational benefits are being delivered, and eligibility for such deferment shall terminate if the student fails to abide by any applicable rule or regulation or to act in good faith in making timely payments. This notice is published pursuant to Public Chapter 279, Acts of 2003, effective July 1, 2003.

Veterans' Dependents' Post Secondary Education Assistance

Pursuant to T.C.A. § 49-7-102, certain statutory fee exceptions exist for dependents and spouses of military personnel killed, missing in action, or officially declared a prisoner of war while serving honorably as a member of the armed forces during a period of armed conflict. Contact the Daniels Center at (615) 904-8347, KUC 124, for more information.

Registration Confirmation

If fees are paid in full by financial aid, Federal Direct or PLUS loans, TELS (Lottery) scholarship, pre-paid tuition programs, Vocational or Veteran's rehabilitation or other credits, students must complete the registration process by confirming that they will attend MTSU for the term. If balance is a credit or zero, they must Confirm Registration on RaiderNet by the fee payment deadline.

To confirm registration, students should

- log in to PipelineMT at www.mtsu.edu;
- click on RaiderNet, then on the Student tab;
- select Student Account;
- select Confirm Enrollment/Registration Payment/Account Detail for Term;
- select the term. The account balance summary and account detail for the term will be displayed.
- click "Yes, I will attend during ..." and wait for a confirmation number.

Students will be given a confirmation number and should write down the confirmation number and date as proof of confirmation. If in doubt, students should try the process again and the system will tell them if registration has been confirmed. The confirmation number will not be repeated. If the student does not receive a confirmation number and is instead taken to the bill payment system, aid is either not on the account or a balance is still due.

Please note: Reviewing the class schedule does not confirm registration; students **MUST** select the Confirm Registration option, then select the option "Yes, I attend during . . ." When this option is selected, **the student will be given a confirmation number if the registration is confirmed.** When a **confirmation number** is assigned, the system will hold classes. If registration is not confirmed before the fee payment deadline, the class schedule will be deleted from the computer. Financial aid refunds cannot be processed until confirmation is completed.

Check the online registration guide and www.mtsu.edu/tuition for detailed instructions, dates, and deadlines for each term.

All students who preregister and decide not to attend MTSU should access RaiderNet prior to the final fee payment date for the term to drop all classes from their records. If they decide not to attend MTSU after confirming, they must withdraw from the University.

Fee Adjustments

NOTE: No refund of housing, registration, or other fees will be made to students who are dismissed or suspended.

Tuition, program services fees, and out-of-state tuition will be adjusted as follows:

1. Courses cancelled by the University will receive a 100% reversal of tuition and fees.
2. Students who preregister and drop classes or withdraw from all classes prior to the first day of class will receive a 100% reversal of tuition and fees. See the current online registration guide for fee adjustments and schedule adjustment dates.
3. A full (100%) reversal of tuition and fees will be provided in case of a student's death.
4. Tuition, registration fees, materials and course fees, residence hall rent, and meal plans will be adjusted at the rates of 75 percent or 25 percent to students who officially withdraw from the University prior to the dates specified in the registration guide published each semester. The same fee adjustment schedule applies to students who drop below full-time to an hourly load. The calculation of tuition and fee adjustments for a complete withdrawal from the University is based on the percentage charge of all courses dropped for the term. There will only be an adjustment in fees if the new calculated charge is less than the original charge. Not all withdrawals will result in a refund or reduction in fees. The calculation of tuition and fee adjustments for dropped courses is based on the charge for currently enrolled hours plus a percentage charge of all courses dropped. There will only be a reduction in fees if the new calculated charge is less than the original charge. Not all dropped courses will result in a refund or reduction in fees.

Refunds due to fee adjustments will be processed beginning approximately two weeks after the end of each fee adjustment period. It takes several weeks to process all the refunds. The University will offset against proposed refunds any amount owed by the student to the University.

Drop/Withdrawal from class. Students who drop or withdraw from classes will have a balance due under the Installment Payment Plan. Fees are adjusted based on the drop or withdrawal date. The fee adjustment percentage is NOT applied to the amount of payment, but rather as a percentage adjustment of total fees. A refund would be

issued to the student only if the newly adjusted amount of fees is less than the amount that has been paid by the student. Withdrawal from classes does not negate the student's responsibility to pay the balance of fees after the semester has begun.

Additional information on tuition and fee adjustments can be found on the Bursar's website:
www.mtsu.edu/withdraw/fee-adjustment.php.

Refunds of Housing Expenses

Residence Halls

Applications for residence halls and on-campus apartments must be accompanied by the required prepayment as outlined in the license agreement. Prepayment is a security of good faith that denotes the applicant's serious intent to reside in on-campus housing. Prepayment fees are \$300, \$150 of which is applied toward Fall semester charges, and \$150 of which is applied toward Spring semester charges. This prepayment is refundable prior to check-in according to the following schedule. All cancellations must be submitted in writing to the Housing and Residential Life Office. Prepayment amounts represent approximately 25 percent of the total semester fee and may vary from year to year. Students should contact Housing and Residential Life to verify specific changes.

Academic Year (Fall and Spring) Applications

Date of Cancellation	Refund Amount
By May 1	\$150.00
By June 1	\$100.00
By July 1	\$ 50.00
After July 1, but prior to the first check-in day in August	\$ 00.00

Spring Semester Only Applications

Date of Cancellation	Refund Amount
By October 15	\$ 50.00
After October 15, but prior to the first check-in day in January	\$ 00.00

Summer Housing

Details regarding application, fees, and refunds for summer assignment to residence halls and on-campus apartments may be obtained by contacting the Housing and Residential Life Office at (615) 898-2971.

Housing Fees

The refunds of residence hall fees after registration will be prorated on a weekly calendar basis when the student is forced to withdraw from the residence hall because of approved medical reasons confirmed in writing by a licensed physician.

Full refund will be made in the case of death. No refund will be made other than under the above conditions, except as specified in the Student Housing Agreement.

Direct Deposit of Financial Aid Credit Balance Refunds

Students receiving financial aid who expect to receive a refund must first be sure they have met all financial aid eligibility requirements, confirmed registration, have no holds, and completed all necessary paperwork.

All students must sign up for direct deposit online through RaiderNet. Online sign-up via e-Refund must be completed at least seven (7) days prior to the first day of classes to have the refunds available in accounts on the first day of classes.

Detailed instructions are available online at www.mtsu.edu/tuition/direct-deposit.php. It is critical that all information be entered correctly to avoid delay of refunds.

For students who choose not to sign up for direct deposit for financial aid refunds, a notice will be sent to the students' email accounts when a check is available for pickup. Checks may not be available until the 14th day of the semester.

Financial Aid

The University offers financial aid assistance to eligible students through funding received from federal, state, institutional, foundation, and external sources. Generally, students must complete the Free Application for Federal Student Aid (FAFSA) at www.fafsa.gov each year to be considered for financial aid. The FAFSA School Code for MTSU is **003510**. For current information about financial aid, visit the MT One Stop website at www.mtsu.edu/one-stop.

Academic Regulations

Academic Credentials, T.C.A. Sec. 49-7-133, Misrepresentation of

It is a Class A misdemeanor to misrepresent academic credentials. A person commits the offense of misrepresentation of academic credentials who, knowing that the statement is false and with the intent to secure employment at or admission to an institution of higher education in Tennessee, represents, orally or in writing, that such person

1. has successfully completed the required coursework for and has been awarded one or more degrees or diplomas from an accredited institution of higher education;
2. has successfully completed the required coursework for and has been awarded one or more degrees or diplomas from a particular institution of higher education; or
3. has successfully completed the required coursework for and has been awarded one or more degrees or diplomas in a particular field or specialty from an accredited institution of higher education.

NOTE: It is also inappropriate to knowingly falsify test scores and other admission materials. In such a case, these materials will be invalidated and any potential admission resulting from them will be rescinded.

Any applicant who misrepresents his or her credentials will be subject to disciplinary action from the University which may include dismissal from the University.

Academic Integrity

Students at MTSU are expected to be intellectually honest and forthright in their academic activities. Proper credit should be given to sources of all work done. To attempt to use the ideas or words of others or to falsify data is to plagiarize (i.e., adopt, present, or reproduce ideas, statements, images, or works of others as one's own without proper acknowledgment) or fabricate (i.e., falsify any information or citation) respectively, neither of which is acceptable. Appropriate action will be taken as deemed necessary by the College of Graduate Studies, up to and including expulsion from MTSU and the rescinding of any graduate degree awarded as a result of a breach in academic integrity.

Academic Standards-Retention, Probation, and Suspension

Degree-seeking students are expected to take appropriate courses and make satisfactory progress toward their degree objectives as determined by the graduate program. A graduate student at the master or specialist level must maintain a cumulative GPA of **at least 3.00** for all graduate work completed at MTSU as well as in the major. A doctoral student must maintain a minimum GPA of **at least 3.25**. Six semester hours of C grade (C+, C, or C-) coursework may be applied toward a master's or specialist's degree (unless prohibited by the degree program - see individual programs for details); seven hours of C grade may count toward a Ph.D. No grade below C- may be applied toward a degree; however, all grades are included in calculation of cumulative GPA.

A graduate student failing to meet the applicable minimum cumulative graduate GPA retention standard will be placed on **academic probation** for the subsequent term. Probation in itself has no serious consequences other than to alert the student of potential academic problems and the requirement to (re)establish satisfactory academic status. Once on probation, a student has three consecutive semesters in which to restore the cumulative GPA to the minimum required. If the student fails to attain the required GPA at the close of the third semester of probation, the student will be suspended automatically.

A graduate student who is on academic probation, then returns to good standing will no longer be on probation. Should they once again fall below the minimum cumulative graduate GPA for retention (GPA < 3.00 for master's or < 3.25 for doctoral) during their course of study, rather than being placed on probation again, they will be suspended. In order to reenroll must formally appeal the suspension to the graduate program by following established requirements within the program. In the event that a student is suspended and subsequently upon appeal is granted permission to reenroll, should the student fail to maintain the minimum cumulative GPA, there will be no second probationary period. The student will be terminated at the close of the semester and no longer eligible for matriculation in any program at MTSU.

Students whose appeal has been denied by their graduate programs will have the right to appeal this decision by notifying the associate dean of the College of Graduate Studies in writing by the first week of the term following their

suspension. An Ad Hoc committee made up of members of the MTSU Graduate Council from other disciplines will be created. The student and program will have the opportunity to represent both the appeal and decision to the committee at this meeting. The decision of the committee is final.

Academic Standing-Removal from the College of Graduate Studies

In addition to students who are permanently suspended due to failure to return to good standing following a suspension (See Academic Standards - Retention, Probation, and Suspension), students may be removed from their programs due to an unsuccessful suspension appeal or for failure to make satisfactory academic progress. In the case of failure to make satisfactory academic progress, the program may recommend dismissal to the College of Graduate Studies with clear documentation as to the reasons for recommendation. Action on this recommendation will be made by the dean of the College of Graduate Studies. Appeals of this dismissal would be made to the College of Graduate Studies and are considered by an Ad Hoc Graduate Council Suspension Appeals Committee. The action of this committee is final.

Access to Records

For the MTSU policy concerning student access to educational records, see Student Access to Educational Records.

Appeals, Other

Graduate students have the right to appeal **for cause** any decision affecting their academic standing as graduate students. **Cause** excludes grade appeals, which are under the purview of the MTSU Grade Appeal Committee. The Appeal Advisory Committee of the Graduate Council is an ad hoc committee reporting to the dean of the College of Graduate Studies. The committee is convened at the discretion of the dean of the College of Graduate Studies. The Graduate Council and the College of Graduate Studies have approved in principle the document ***Appeal Advisory Committee of the Graduate Council***. Copies of this document are made available to all graduate students at the website (www.mtsu.edu/graduate/pdf/StudentAppealsGradCouncil.pdf) and in the College of Graduate Studies, Sam H. Ingram Building.

Classes-Cancellation of Scheduled Classes

The minimum enrollment requirement is ten students for upper-division and 5000-level graduate classes; eight students for 6000-level classes; and six enrollees for 7000-level classes (excluding graduate research courses). Any class may be canceled if the number of enrollees is deemed insufficient; however, no scheduled class may be discontinued without the approval of the dean of the college in which the course is offered.

Credit Hour Unit

A credit hour unit is one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for 15 weeks, or equivalent academic activities, to achieve the student learning outcomes for the credit hour. Laboratory and studio classes usually earn one credit for each two hours of attendance or equivalent for a semester unless otherwise indicated.

Degree Plan, Filing a Form

In consultation with the graduate advisor, each degree-seeking student must file a formal outline of the degree program on a degree plan available at the College of Graduate Studies or on the website (www.mtsu.edu/graduate/forms.php) prior to the start of their first term. Individual departments are responsible for monitoring the completion of prerequisites. The degree plan requires the approval of the major professor and/or the graduate program director.

Degree Plan, Revision Form

Changes in degree programs are permitted upon proper filing and approval of a Change in Degree Plan Form, which is available at the College of Graduate Studies Web site (www.mtsu.edu/graduate/pdf/DegreePlanReviseALL.pdf). Changes in degree programs will take effect at the beginning of the semester after the change in degree plan is approved. When unforeseen circumstances arise during the semester of graduation, an exception to the implementation date may occur at the request of the graduate program director and with the approval of the dean of Graduate Studies.

Examinations, Comprehensive (for Specialist's and Master's Students)

This examination is scheduled by each department during the time period designated by the College of Graduate Studies. Normally, the comprehensive examination may be taken no more than twice, and failure to pass the comprehensive exam on the second attempt terminates one's degree program. Any exception to this "twice-only" rule must be recommended by the graduate program and approved by the dean of the College of Graduate Studies. See also Glossary.

Examinations, Qualifying and Preliminary (for Ph.D. Students)

Please see the section under Doctor of Philosophy Degree and/or the Glossary.

Examinations, Other

Any graduate student may be required to take one or more additional tests designed to measure general educational achievement and/or achievement in selected major areas.

Graduate credit may not be earned by CLEP or Special Examination.

Grades, Appeal of Course Grades

Level One

1. Student appeals concerning a course grade should be resolved by conference between the student and the faculty member who assigned the grade.
2. In the event of an impasse between the student and the faculty member, a student with an appeal of a grade shall discuss it with the department chair within ten (10) days of the conference with the involved faculty member. The department chair shall investigate the circumstances, record his/her findings, and send a copy to the student and the faculty member within ten (10) days of the notification of impasse. Although the department chair does not have the power to change the grade, he/she will make a recommendation concerning the appeal.

Level Two

1. If the student is not satisfied, he/she may, within fifteen (15) days following receipt of the department chair's recommendation, refer the appeal plus all relevant data including stated reasons why he/she believes the appeal has thus far not been satisfied to the Provost's Office. The vice provost for Academic Affairs shall select a college committee to hear the appeal and transmit the appeal documents to the committee chair or to the office of the dean of the college which houses the selected appeals committee.
2. The committee hearing the appeal will receive documents and testimony regarding the circumstances, will record its findings, and shall render a decision. Notification of the committee's decision will be made to the student, faculty member, department chair, college dean, vice provost for Academic Affairs, and the director of Records.
3. The decision of the committee hearing the appeal will be final concerning the grade in question.

NOTE: In cases where the department chair is the person against whom the complaint is lodged, then the dean in whose college the department is located shall assume the duties of the chair in the investigation and decision making.

Additional Information

1. The number of days indicated at each level above shall be considered the maximum, but every effort should be made to expedite the process.
2. The failure of the student to proceed from one level of the appeal procedure to the next level within the prescribed time limits shall be deemed to be an acceptance of the recommendations and/or decision previously rendered. All further considerations and proceedings regarding that particular appeal shall cease at that point.
3. A grade appeal may be withdrawn at any level without prejudice.
4. All appeal proceedings shall be kept as confidential as may be appropriate at each level.
5. A grade appeals committee shall have reasonable access to all official records for information necessary to the determination of a recommendation.

Grades, Grade Point Average (Quality Credits)

Grade points are numerical values assigned to letter grades in order to provide a basis for quantitative determination of grade (quality) point averages. The four-point system with pluses and minuses is used.

The following system is used in determining grade point average:

Grade		Grade Points
A	=	4.00
A-	=	3.67
B+	=	3.33
B	=	3.00
B-	=	2.67
C+	=	2.33
C	=	2.00
C-	=	1.67
D+	=	1.33
D	=	1.00
D-	=	0.67
F	=	0.00

The scholastic standing of a student is expressed in terms of grade point average (GPA). A GPA is the total number of grade points divided by the total number of credit hours (exclusive of P, S, and U credit hours) at Middle Tennessee State University. Any transferred courses are included in the calculation. For a grade of F, the credit hours count, but zero grade points are earned.

Grades, Marking System

The following notations are used by faculty of the University to indicate the quality of the work performed by students taking graduate courses:

A, A-
B+, B, B-
C+, C, C-
D+, D, D-
F

Grades That Do Not Influence Grade Point Average

W - Withdrawal
NC - No credit (audit)
I - Incomplete
S - Satisfactory
U - Unsatisfactory
P - Pass

The P/F grade is given only in those courses with prior approval to use pass/fail grading. Courses may be taught on a pass/fail basis only after approval of the Graduate Council. Course descriptions state if pass/fail grading applies. Pass or Satisfactory/Unsatisfactory grades are **not** used in determining the grade point average. However, satisfactory grades do count toward graduation credit requirements and are treated in every other respect as being equivalent to traditionally graded courses. Any course in which an "unsatisfactory" is received does not count toward graduation credit requirements.

The grade I indicates that the student has not completed all course requirements due to illness or other uncontrollable circumstances, especially those which may occur toward the close of the term. Mere failure to make up work or turn in required work on time does not provide a basis for the grade of I unless the extenuating circumstances noted above are acceptable to the instructor. When a student fails to appear for a final examination without known cause, the grade to be reported should be determined as follows: If the student has done satisfactory work to that point, the grade I may be reported on the assumption that the student was ill or will otherwise present sufficient reason for official excuse; if the student has attended irregularly and has not done satisfactory work to that point, the grade F should be reported.

The "incomplete" must be removed during the succeeding semester, excluding summer. Otherwise, it converts to a grade of F. A student should not make up the "incomplete" by registering and paying again for the same course. The I grade carries no value until converted to a final grade.

Grades by RaiderNet

Students may view their grades online each semester by selecting the appropriate option on RaiderNet. No student can view grades on RaiderNet until all debts or obligations owed to MTSU have been discharged.

Graduate Courses, Permission to Enroll in

Seniors at MTSU with 98 semester hours of credit may be allowed to take up to 12 semester hours of graduate coursework. Approval is required by the undergraduate advisor and by the dean of the College of Graduate Studies. Undergraduate students wanting to take graduate courses must complete the Application for MTSU Undergraduate Students to Take Graduate Work which is available through the College of Graduate Studies. With the exception of students enrolled in an approved Accelerated Bachelor's/Master's (ABM) program, graduate coursework may not be used to meet the requirements for an undergraduate degree.

NOTE: *The Jennings A. Jones College of Business does not allow undergraduate students to take graduate courses unless they are enrolled in an approved Accelerated Bachelor's/Master's (ABM) program.*

Intent to Graduate

An Intent to Graduate form, available on the College of Graduate Studies website (www.mtsu.edu/graduate/academicforms.php), must be filed by the student by the end of the second week of the semester in which the student plans to graduate or no later than the end of the first week of S2-June term (for August graduation).

Prerequisites

The prerequisite for the graduate major is an undergraduate minor or its equivalent and/or the recommendation of the graduate program director. The prerequisite for the graduate minor is 12 semester hours of undergraduate coursework in that area or its equivalent and/or the recommendation of the graduate program director or delegate. If prerequisite course work is marginally deficient, the student may be admitted to the College of Graduate Studies to make up the deficiencies concomitantly while taking graduate courses. Prerequisite courses do not apply toward meeting graduate program requirements. Monitoring the completion of prerequisites is the responsibility of the individual departments.

Repeated Courses

A graduate student may repeat graduate courses in which a grade of B- or lower was earned. However, there are certain restrictions and limitations. A **maximum of two (2) courses**, not to exceed eight (8) credits combined, may be replaced. The grade in the second attempt **replaces** the original assigned grade in the first attempt regardless of the earned grade. For all additional courses or subsequent repeated courses, there will be **no grade replacement**; i.e., **all earned grades** will be used in the grade point average calculation and are recorded on the transcript.

Graduate students may not repeat a course in which they have previously earned the grade of A, A-, B+, or B without written approval from the director of graduate program director and dean of the College of Graduate Studies. If granted, there will be no grade replacement in the GPA calculation; i.e., all attempts will be used in the grade point average calculation and recorded on the transcript.

Semester Hour Load of Student

A student's enrollment status is determined by the number of credit hours taken per term according to the following:

Full-time - 9-12 graduate hours

Three-quarter time - 7-8 graduate hours

One-half time - 5-6 graduate hours

Graduate students are limited to a maximum of 12 graduate hours per semester. If an exception is requested, overload forms must be signed by the director of graduate studies and the dean of the College of Graduate Studies (www.mtsu.edu/graduate/pdf/OverloadRequest.pdf). Full-time status for students holding graduate assistantships is six (6) graduate semester hours.

Teacher Education Program, Postbaccalaureate

The post-baccalaureate teacher education program is designed for individuals who have completed a baccalaureate degree but who did not complete teacher preparation. The College of Education requires candidates to address any course and program deficiencies in their undergraduate education to ensure the attainment of the knowledge and skills required in general education, professional education, and the major for the teaching field. Additional coursework and program requirements will be determined by the teacher licensure analyst. Transcript analysis forms for the post-baccalaureate program are available at

www.mtsu.edu/education/docs/NewRequestforTranscriptAnalysisTraditional202014v2.pdf.

Postbaccalaureate students must also make formal application for admission to the teacher education program. Admission to teacher education is a prerequisite to enrollment in upper-division courses in Elementary Education (ELED), Reading (Literacy) (READ), Special Education (SPED) (except SPED 3010), Foundations of Education (FOED), or Youth Education (YOED).

Teacher Licensure

All applications for professional teaching licenses in Tennessee must be filed with the dean of the College of Education who is responsible for recommending each applicant from this University. All applicants for teacher licensure should furnish the Tennessee State Department of Education a report of scores attained on the Praxis. A copy of the scores should be sent to the Office of the Dean, College of Education. MTSU verification of the scores will be forwarded with the Application for Licensure.

Time Limit

Students have six (6) years from the initial semester of matriculation to complete the requirements for a master's or specialist's degree. There is a ten-year time limit from initial matriculation to complete all requirements for the doctoral degree. Exceptions to these time limitations, for good cause, will be considered by the dean of the College of Graduate Studies when submitted in writing with a proposed timeline for completion and the recommendation of the advisor and the graduate program director.

Transcripts

Student copies and official copies of a student's record are furnished free of charge upon written request by the student. No transcript will be provided for a student who has any financial indebtedness to the University or who has not completed admission procedures. Official transcripts from other institutions must be obtained directly from those institutions.

Transfer Credits

In general, only coursework taken while in graduate status, prior to attending MTSU, will be transferred and only if those courses were not used in partial satisfaction of degree requirements at the previous university. Coursework transferred or accepted for credit toward a graduate degree **must** represent graduate coursework relevant to the degree, with course content and level of instruction resulting in student competencies at least equivalent to those of students enrolled in the institution's own graduate degree programs. Transfer credit requires the recommendation of the graduate program director and approval of the dean of the College of Graduate Studies. Transfer courses with grades below B will not be accepted for credit in any graduate degree programs. Also, note that credits completed seven (7) or more years prior to admission to a degree program at MTSU will not generally be considered for transfer. No graduate credit may be obtained by correspondence or work experience. A maximum of 12 semester hours of residence credit (6 in the major area) may be transferred and applied to a master's or specialist's degree. Doctoral students should check with their graduate program director for the policy on transfer of credits into their doctoral degree program.

Withdrawals from the University

The College of Graduate Studies handles all issues relating to graduate students withdrawing from the University. Students are highly encouraged to consult with the College of Graduate Studies before making any decisions about withdrawing. Please also consult the Registration Guide (www.mtsu.edu/registration/registration-guide.php) for withdrawal and fee adjustment deadlines. Questions about withdrawing should be directed to the College of Graduate Studies via phone at (615) 898-2840 or via email at graduate@mtsu.edu.

General Withdrawal Guidelines:

1. Withdrawing Prior to Term - Students finding it necessary to withdraw from all classes prior to the beginning of a term may withdraw via RaiderNet.
2. Withdrawing During a Term
 - a. During the first two weeks (14 calendar days) of a term, courses may be dropped via RaiderNet (link to RaiderNet) without assignment of a grade on the official transcript.
 - b. Beginning on 15th calendar day through 60% of a term, student can drop some or all courses via RaiderNet (link to RaiderNet) and a grade of "W" will be assigned.
 - c. After 60% of the term, a complete withdrawal from ALL classes can be accomplished via RaiderNet (link to RaiderNet), through the last day to withdraw in each term. Instructors assign the appropriate grade of "W" if the student is passing or "F/FA" if the student is failing.
 - d. After 60% of the term, individual courses cannot be dropped via RaiderNet. Individual courses may be dropped if appropriate signatures are obtained on a drop form and submitted to the MT One Stop.
 - e. The deadline to withdraw from the University (all classes) and receive a grade of "W" or "F," as determined by the instructor is generally one week prior to the last day of classes and will be noted in the Registration Guide for each term.

NOTE: Fees, Financial Aid, Housing, etc. can be impacted anytime a student withdraws or drops a course. Consult the Registration Guide and those offices for more information.

Summer differs; please check **Registration Guide** for specific dates.

If extreme extenuating circumstances necessitate a graduate student's withdrawal from the University after 60% of the term, exceptions may be made. A grade of "W" may be recorded with written concurrence of the faculty member, but only if the extenuating circumstances are first verified by the College of Graduate Studies. Students who fall under this category should schedule an appointment with the withdrawal coordinator in the College of Graduate Studies and provide a written statement and all documentation to support their extenuating circumstances. The University Withdrawal Policy can be reviewed at www.mtsu.edu/policies/student-affairs/III-00-06.php.

Glossary of Terms

Admission to degree status-Admission to the College of Graduate Studies as a graduate student for the purpose of seeking a graduate degree. This status requires completing a graduate admission application; meeting all entrance and test requirements; transmittal of relevant official transcripts; payment of an application fee; approval by the graduate program/department; and approval by the College of Graduate Studies. In the case of international students or domestic students whose highest degree is from an institution outside the United States, an external evaluation of the relevant official transcripts from an evaluation source such as WES may also be required for all non-English transcripts.

Admission to non-degree status-Admission to the College of Graduate Studies as a post-baccalaureate student for the purpose of officially taking graduate courses but not seeking a graduate degree through MTSU. This status requires completing a graduate admission application; transmitting relevant official transcripts; payment of an application fee; and approval by the College of Graduate Studies. Not all graduate courses are open to non-degree students; thus the student should consult with the director of graduate study in the department.

Advancement to candidacy-Status of the student who has completed all or a substantial portion of the curriculum and has successfully passed the culminating examination (comprehensive exams for master's students or preliminary exams for doctoral students). Advancement to candidacy is recognition that the student is prepared to commence the thesis or dissertation research. For non-thesis students, it verifies that the student has completed all degree requirements and is eligible for graduation. The Advancement to Candidacy form is submitted to the College of Graduate Studies by the graduate program director and identifies the members of the thesis (www.mtsu.edu/graduate/pdf/ThesisCommittee_Candidacy.pdf) or dissertation committee (www.mtsu.edu/graduate/pdf/PrelimExam.pdf).

Cognate-Six semester hours of related coursework.

Comprehensive examination-An examination given to master's and specialist's degree students, generally during the last semester of coursework. The examination for all students may be oral, written, or a combination of both modes. It may be taken no more than twice. Students must be currently enrolled to be eligible to take the comprehensive examination. The purpose of this examination is to assess the candidate's knowledge of a broad academic field and to evaluate whether the candidate has attained certain standards and/or requirements necessary to successfully complete the program. If the examinations are written, they are to be kept on file in the department. The student has the right of access to his or her graded exam for a period of five (5) years.

Concentration-A curricular component of a graduate program representing a well-recognized subset or branch of the discipline. A concentration appears on the student's graduate transcript.

Conditional admission-The granting of temporary admission into a graduate program with certain stipulations being placed upon the student. Continuation in the program as a degree-seeking student is contingent upon fulfilling the specific requirements established at the time of the admission. Conditional admission into the College of Graduate Studies may be granted if the applicant has less than the minimum requirements, i.e., either the required minimum grade point average for graduate study or the test scores (but not both) are not met. Such admission is at the discretion of the graduate dean. Monitoring of any conditions is the responsibility of the program.

Continuous enrollment-Enrollment during the regular academic year (Fall and Spring Semesters) unless the academic program requires year-round enrollment. Continuous enrollment is expected of all students from initial enrollment until completion of dissertation for doctoral students and until completion of thesis for all specialist's and master's students. Students in non-thesis programs should maintain continuous enrollment through their culminating experience.

Degree plan-The degree plan specifies the courses that the student is required to take to complete the curricular requirements. This form must be filed and approved at the time of admission by the pertinent graduate program personnel (e.g., graduate advisor, graduate program director, etc.), and the dean of the College of Graduate Studies (or designee). The form may be amended as needed by submitting an approved Change of Degree Plan Form (www.mtsu.edu/graduate/pdf/DegreePlanReviseALL.pdf).

Full-time/part-time graduate status-See "student load."

Graduate advisor-A faculty member appointed by the department and approved by the College of Graduate Studies to advise graduate students and provide curricular planning counseling. Graduate students should consult with their graduate advisors prior to or immediately upon being admitted to a graduate program. A list of graduate advisors may be obtained from the graduate program or the relevant department.

Graduate analyst-A staff member within the College of Graduate Studies assigned to assist the individual graduate student with respect to all relevant administrative matters from the point of admission through graduation.

Graduate Program Director-A faculty member who holds graduate faculty status appointed to serve as the principal officer of a graduate program with respect to curricular and other relevant matters.

Graduate status-Status whereby a post-baccalaureate student is declared eligible to enroll in graduate courses at MTSU. The granting of graduate status does not necessarily mean that one has been admitted to a graduate program. (Also see "hold" and "admission.")

Graduation requirements-Those academic and other requirements that must be successfully completed in order to be eligible for receipt of the degree. In general, the requirements in existence at the time of matriculation are those that must be fulfilled. These requirements are listed in the graduate catalog of that year. Changes in a graduate curriculum may occur while a student is enrolled. If so, the student will have the option of fulfilling the new requirements or following the original plan in existence at the time of matriculation. This is subject to "stop-out" limitations and course availability. (See "stop-out.")

Hold-A block placed on registration (or transcripts). For example, a registration hold will be placed on all students who have not filed a degree plan prior to or during their first semester.

Intent to graduate-Indication that the candidate is planning to complete all degree requirements during the current term. An Intent to Graduate Form, signed by the advisor, must be filed by the candidate **by the date listed on the College of Graduate Studies website for the semester of planned graduation**. This authorizes release of the student's file for final evaluation and authorizes information to be collected for issuance of the diploma.

Major-A field of study representing a well-recognized discipline in which a graduate program is offered. A major appears on the student's graduate transcript.

Major professor-The faculty member providing the primary scholarly research mentoring to the graduate student. The major professor serves as the director or chair of the thesis or dissertation committee.

Matriculation-The first semester of enrollment after admission to a graduate program.

Minor-A free-standing curricular component of a graduate program representing an academic discipline. This designation verifies that scholarly expertise in the minor field has been achieved in addition to that attained in the major discipline.

Plagiarism-The use or reproduction of material from another person's work (e.g., publications, productions, or intellectual property) without revealing the source and/or clearly acknowledging the degree of dependency. If materials are reproduced verbatim from another source, or even reproduced in large part with only minor modification, proper citation **must** occur. To avoid allegations of plagiarism, clearly cite the source and use quotation marks to identify the excerpts, or clearly acknowledge the source by indenting and single-spacing the reproduced selections.

Preliminary examination-The second of a set of doctoral examinations that are taken at the end of coursework and are preliminary to entering the dissertation phase. Preliminary examinations may be both written and oral and are inclusive of coursework and supplementary readings. Students should consult with their advisors as to the individual program's policy on timing and content of examinations.

Prerequisites-Courses that are required for completion in order to provide the necessary academic background for subsequent graduate coursework. Prerequisites are determined and monitored by the individual graduate program.

Qualifying examination-An examination given to doctoral students to assess the level of mastery of knowledge in the discipline and to determine if the student is qualified to continue as a candidate for the doctoral degree. Individual programs often require the successful completion of the qualifying examination after the first year of the doctoral program. Students should consult with their advisors as to the individual program's policy on timing and content of

examinations. Written portions of the examination are to be kept on file in the department for a period of five (5) years, and the student has the right of access. Passing the examination is a milestone in academic achievement by a doctoral student.

Readmission (reenrollment)-Applications for readmission must be filed if a graduate student fails to maintain continuous graduate enrollment (excluding summers). If granted, the student may reenroll for the identified term. Readmission, if granted, is based on competitiveness with current applicants and is not guaranteed. The department or program should be consulted for its readmission policy.

Repeat policy-The number of graduate courses possible for repetition for the purpose of grade replacement is limited to two. These two courses may not exceed 8 credit hours.

Satisfactory progress-Successful advancement of a student toward his/her degree objective in the judgment of the faculty and dean of the College of Graduate Studies. To be deemed as making satisfactory progress, a graduate student must maintain a cumulative GPA of 3.00 (3.25 in doctoral programs) or greater and **must** successfully complete sufficient and appropriate graduate courses. These graduate courses must apply toward the graduate curriculum in a manner consistent with completion of the degree objective and within the established time limit.

70/30 Rule-A curricular stipulation for master's degree candidates specifying that no more than 30 percent of the total degree hours may be dually listed as undergraduate/graduate hours. Candidates with more than 30 percent of the degree program dually listed as undergraduate/graduate hours cannot graduate until the balance is attained. Normally, no more than 3 credits of thesis research (course 6640) will be applied toward the minimum degree hour requirement. Careful curricular planning in consultation with the graduate advisor is essential.

Specialization-A curricular component of a graduate program representing a well-recognized subset or branch of the discipline. A specialization does not appear on the student's graduate transcript.

Stop-out-Events in life-such as family leave, illness, or military duty-may result in a student being unable to maintain continuous enrollment. In such a case, students may request permission to interrupt their studies on a temporary basis. A stop-out is the period of time during which a student fails to register for successive academic sessions. If the stop-out period exceeds one academic year (Fall and Spring semesters), the student may be required to fulfill degree requirements in existence at the time of reenrollment, rather than those in place at the original matriculation. A formal request to stop-out must be filed by the student, endorsed by the graduate program director in their department, and approved by the dean of the College of Graduate Studies prior to the beginning of the stop-out period. If approved prior to the beginning of the stop-out, this period is not counted toward the time limit for degree completion. A stop-out may be utilized no more than one time during the time limit for the degree program.

Time limits-The time elapsed from matriculation during which a student is required to complete all degree requirements. Master's and specialist's students have six years from matriculation to complete all degree requirements. Doctoral students have ten years from matriculation to complete all degree requirements. These time limits are subject to extension but only for compelling reasons. If an extension is to be granted, it must be supported by the graduate program and approved by the dean of the College of Graduate Studies.

Transfer credit-Student's coursework taken at other colleges and universities that is formally transferred to the MTSU graduate record. In general, only coursework taken while in graduate status **prior** to attending MTSU will be transferred and only if those courses were not used in partial satisfaction of degree requirements at the previous university. Transfer credit should demonstrate equivalency to existing MTSU courses acceptable for the graduate degree and requires the approval of the student's graduate program and the dean of the College of Graduate Studies during the first semester of enrollment at MTSU. In general, credits completed seven (7) or more years prior to admission to a degree program at MTSU will not be considered for transfer.

Policies

Graduate Student Bill of Rights and Responsibilities

The Graduate Council and the College of Graduate Studies have approved in principle the document *Graduate Student Bill of Rights and Responsibilities*.

Rights

1. Graduate students have a right to be respected as individuals of merit and as junior colleagues of faculty. The student's vulnerability must not be exploited in any way by faculty, administration, or staff. (Reference: Faculty Handbook, Ethics Guidelines, Section IV, I.B., I.C.2, page 2)
2. Graduate students have a right to an accurate and timely description of the availability and the likelihood of financial and resource support within their program and within the University and will be given an equal opportunity to compete for support for which they are eligible.
 - a. Prospective and currently enrolled graduate students should be provided a thorough description of the requirements and qualifications necessary for holding teaching assistantships and graduate assistantships and receiving financial support from the University.
 - b. Prospective and currently enrolled graduate students should be provided a thorough description of the requirements and qualifications for all academic and financial awards in their programs and in the Graduate Catalog. They are to be assured that competition for any and all academic awards will be available to eligible graduate students and that evaluation for such awards will be fair and objective. They also should be informed of the procedures for evaluating applicants.
3. Graduate students have a right to be informed of specific requirements for achieving an advanced degree. Each department should communicate clearly these requirements to its students, and it should notify currently enrolled students in writing of any changes. Prospective and currently enrolled graduate students have a right to know of the normal time to complete a degree within a specific graduate program.
4. Graduate students have a right to a nonbiased evaluation of their progress toward achieving an advanced degree (Constitution of the Student Government Association, Art. II Sec. 3). The criteria should be clearly understood by the graduate advisor and student.
5. If a graduate student requests an explanation, reasons for unsatisfactory performance on preliminary, qualifying, or comprehensive examinations should be given in writing.
6. Graduate students have a right to substantive feedback and regular guidance concerning their academic performance.
 - a. Graduate students and their thesis/dissertation directors should arrive at and maintain a mutually agreeable schedule of evaluative/supervisory conferences.
 - b. Graduate students must be notified in writing of unsatisfactory performance before any attempt is begun to dismiss them from a graduate program. Only the dean of the College of Graduate Studies can dismiss a student from a graduate program for academic reasons and normally only upon the recommendation of the graduate program coordinator and department chair. Graduate students have the right to appeal for cause any decision affecting their academic standing as a graduate student. Cause excludes grade appeals, which are under the purview of the MTSU Grade Appeals Committee. The burden of responsibility rests with the appellant to provide a timely, cogent, and convincing written documentation of the facts upon which the appeal is based. Further information may be obtained from the appeals document from the Graduate Council, Section III.
7. Graduate students have a right to freedom from unlawful discrimination in any actions, including those based on gender, race, age, sexual orientation, disability, and religious or political beliefs. (Constitution of the Student Government Association, Art. II Sec. 1.2.6; MTSU Policy 302:III) University grievance procedures should be available upon request at the Graduate College. Opportunities for informal resolution should also be explained to the student when appropriate.
8. Graduate students have a right to reasonable confidentiality in their communications with professors. (Constitution of the Student Government Association, Art. II Sec. 4; MTSU Policy 302:IV)

- a. In general, a student's performance or behavior should not be discussed by a professor with other students.
 - b. Discussion among faculty of a student's performance should be of a professional nature and should be limited to the student's academic performance and fitness as a graduate student; the substance of the communication should be based on need-to-know, relevant information.
9. Graduate students have a right to refuse to perform tasks if those tasks are not closely related to their academic or professional development as part of their defined responsibilities.
10. Graduate students have a right to receive fair recognition for their efforts and contributions to cooperative research projects, including co-authorship of publications. Due effort and recognition should be determined prior to the project commencement whenever possible.
11. Graduate students should be represented in the decision-making process relative to graduate issues in their departments and programs; however, the representation is program-specific, possibly taking many different forms. Graduate students should have the opportunity annually to evaluate their professors in writing without fear of retribution.
12. Graduate students have a right to review vitae of faculty members within their degree programs/departments who are qualified/eligible to serve on their graduate committees. These vitae should be made available at the time the students are accepted into their programs to aid them in selecting their committee members.

Responsibilities

1. Graduate students have a responsibility to read and become familiar with the **Graduate Catalog** and the Student Rights and Responsibilities booklet.
2. Graduate students have a responsibility to complete and submit all documents required for admission to the College of Graduate Studies and to their departments.
3. Graduate students have a responsibility to conduct themselves in all academic activities in a manner befitting the professoriate. Graduate students' behavior should be a credit to themselves, the degree program/department, and the University. (Student Rights and Responsibilities booklet)
4. Graduate students have a responsibility to devote appropriate time and energy toward achieving the advanced degree within a reasonable time frame as specified by their graduate programs.
5. Graduate students have a responsibility to uphold ethical norms and honesty in research methodology and scholarship. (Student Rights and Responsibilities booklet; MTSU Policy 540; "A Statement of Graduate Students' Research Rights and Responsibilities at MTSU's Jennings A. Jones College of Business")
6. Graduate students have a responsibility to not misrepresent themselves academically. It is a Class A misdemeanor to misrepresent academic credentials. Any graduate student who misrepresents his or her credentials to gain admission into MTSU will be subject to disciplinary action from the University, which may include dismissal from the University.
7. Graduate students have a responsibility to communicate regularly with faculty members and advisors, especially in matters related to research and progress within the graduate program.
8. Graduate students are encouraged to participate in the campus community to the extent that they are able and to enrich the campus in whatever ways possible, including contributing to the following:
 - a. the academic development and the social environment of the department in which they are pursuing the advanced degree and
 - b. decision-making relative to graduate student issues in the department, student government, and university.

Family Educational Rights and Privacy Act (FERPA)

The Family Educational Rights and Privacy Act (FERPA) affords students certain rights with respect to their educational records. Students must be afforded notice of their rights under FERPA and the types of personally identifiable information considered as directory information. The University policy may be accessed at www.mtsu.edu/policies/student-affairs/III-00-01.php.

Assistantships and Fellowships

A limited number of graduate teaching assistantships, graduate research assistantships, and doctoral fellowships are available. Applications may be obtained from the College of Graduate Studies or from the appropriate academic department. Information on stipends is also available from these sources. An individual is expected to be in good standing, i.e. having met the requirements for admission to graduate school (including satisfactory test scores) and having a cumulative GPA of 3.00 or more. All applications should be submitted to the College of Graduate Studies. For international students serving as graduate teaching assistants, please note the following policy regarding the Required Competency in English, established pursuant to the Senate Joint Resolution 221 adopted by the 1984 General Assembly, the accreditation standards of the Southern Association of Colleges and Schools (4.4.1) and the Board of Trustees (Policy No. 301).

For individuals whose first language is not English, but are seeking to hold a graduate teaching assistantship, they must meet the minimum scores outlined in Policy which are

- a minimum score of 21 on the Speaking subscale of the iBT TOEFL for appointment where there is direct verbal interaction with students;
- a minimum score of 26 of the Speaking subscale of the iBT TOEFL for appointment where lectures are presented to the class or laboratory (a score of 25 may be assigned these duties on a probationary status for one semester);
- a minimum score of 6.5 on the Speaking subscale of the academic version of the IELTS test;
- a minimum score of 40 on the Test of Spoken English (TSE) of the Speaking Proficiency English Assessment Kit (SPEAK) for appointment where there is direct verbal interaction with students;
- a minimum score of 50 on the Test of Spoken English (TSE) of the Speaking Proficiency English Assessment Kit (SPEAK) for appointment where lectures are presented to the class or laboratory (a score of 45 may be assigned these duties on a probationary status for one semester).

GTAs assigned instructional duties on a probationary status must be observed by a member of the department and a faculty member from another department to establish that they are successful in the performance of their teaching duties. Written verification of agreement among the two observers that the GTA is sufficiently fluent in English must be submitted to the College of Graduate Studies before the GTA may be assigned teaching duties in a subsequent term.

Doctor of Philosophy Degree

Middle Tennessee State University offers the Doctor of Philosophy (Ph.D.) degree in Economics, English, Human Performance, Literacy Studies, Computational Science, Mathematics and Science Education, Molecular Biosciences, and Public History. The Ph.D. degree is offered for the purpose of developing doctoral-level expertise combining pedagogy with scholarly achievement and research excellence (applied or theoretical) in the fields of economics, English, human performance, literacy studies, computational science, mathematics and science education, molecular biosciences, or public history. Above all, the Ph.D. recipient from MTSU is a scholar who has acquired advanced academic skills and is well prepared to teach at the collegiate level, conduct independent scholarly investigation, and provide service to the private and public sectors associated with her/his academic discipline.

Admission

General admission requirements for the Ph.D. degree may be found in the admission section of this catalog. Applicants for admission to this degree objective must hold a baccalaureate degree. Although a master's degree is not a general University requirement, each graduate program has the option of establishing such a requisite.

University Requirements Leading to the Ph.D. Degree

Following are the minimum University requirements that must be met to be eligible for the granting of the Ph.D. degree. **In addition, please note that each individual Ph.D. program has established distinct curricular requirements that are specific to that program. Please refer to the applicable graduate program section in this catalog.**

General Course and Credit Requirements

The required minimum is 60 semester hours of coursework with at least two-thirds of the program at the 7000 level. No more than 12 semester hours of dissertation research (course 7640) may be applied toward this 60-hour requirement. If recommended by the student's graduate advisor and approved by the graduate dean, a limited number of semester hours of coursework taken at the master's level may be applied toward this 60-hour requirement.

The 60-credit requirement must include the following:

- a. At least 42 hours in discipline-specific coursework. Undergraduate or dual-listed 4000/5000 courses (or their equivalents) **cannot** be used toward this requirement.
- b. At least 12 semester hours for the dissertation research (course 7640).

NOTE: Once a Ph.D. student has begun taking dissertation research, he/she is expected to enroll in at least 1 semester hour of dissertation research (exclusive of Summer semester) until the dissertation is completed. Thus, Ph.D. students normally enroll for more than 12 total semester hours of dissertation research. Failure to maintain continuous enrollment while in the dissertation phase will require the student to apply for readmission to the program. Readmission is not guaranteed.

Additional Program Requirements

Each doctoral program establishes degree requirements that are specific to that discipline and **may be in excess of the minimum University requirements.** Students should consult the appropriate graduate program section in this catalog.

Pre-dissertation Advisory Committee

As soon as practicable, each Ph.D. student will be assigned an advisor or advisory committee. The advisor/committee is appointed by the graduate program director, in consultation with the student and the potential major professor. If warranted, the advisor/committee membership may be reconstituted upon a recommendation from the graduate program director and approval by the dean of the College of Graduate Studies.

The advisor/committee provides academic guidance to formulate a curricular plan best suited for the academic needs and interests of the student.

Degree Plan

At the time of admission she/he should complete a degree plan in consultation with the graduate program director. The degree plan must be approved by the student's advisor and submitted to the College of Graduate Studies. The degree plan may be amended as necessary by submission of a Change to Degree Plan Form.

Examinations

Each Ph.D. student may be required to take a set of examinations administered by a graduate program. A less than satisfactory outcome (including a fail decision on any component of the examinations) may result in additional academic requirements and/or a re-examination. A re-examination may be given only once. A second fail decision on any component of the examinations results in a recommendation to the dean of the College of Graduate Studies for academic dismissal. The student may appeal the dismissal recommendation, for cause, to the Appeals Advisory Committee of the Graduate Council via the chair of the Graduate Council or the dean of the College of Graduate Studies.

Qualifying Examinations: Each Ph.D. student may be required to take a qualifying examination. The qualifying examination is administered by a graduate program early in the student's doctoral program; often after the first year of the doctoral program. Students should consult with their advisors as to the individual program's policy on the timing and content of the administration. It may assess overall knowledge upon entry into the program or prior to entering the dissertation phase. The results of this examination should be used, in part, to plan the student's academic program. To be eligible to take this examination, the student must be fully admitted to the College of Graduate Studies and to the graduate program. Programs may have additional requirements or assess students by different means. The student should contact the individual program to determine qualifying examination requirements.

Preliminary Examination: The Ph.D. student must also pass an additional or subsequent written and/or oral examination. This examination is referred to as the Preliminary Examination. The student must be in good academic standing and must have at least a 3.25 grade point average in all graduate work. The preliminary examination is intended to assess whether a candidate is qualified to continue in a doctoral program, advance to candidacy, and pursue dissertation work.

All written examinations are given at least one month before the close of the Fall, Spring, and/or Summer semesters. Permission for the Ph.D. student to schedule the preliminary examination requires the approval of the student's advisory committee. Applications may be obtained from the department. The student should contact the individual program to determine the deadlines for submitting these applications.

A satisfactory or passing performance on the written and/or oral examinations means that the candidate is qualified to continue the program as planned.

Written Preliminary Examination

1. The purpose of the written examination is to evaluate the candidate's overall knowledge of the field, integrative skills, ability to organize material, and competency in written expression. The maximum time limit per section for the written examination is eight hours.
2. The written examination is administered by the major department (i.e., the graduate program).
3. The graded written examinations are maintained in the department for a period of five (5) years and are available to the student upon request.

Oral Preliminary Examination

The oral examination is administered by the student's advisory committee and covers the candidate's area of specialization and general knowledge. The committee evaluates the candidate's breadth of knowledge of the field(s), integration and problem-solving skills, competency in oral expression, and potential for conducting independent research.

Advancement to Candidacy

After a student successfully completes the preliminary examination, the program files an Advancement to Candidacy Form with the dean of the College of Graduate Studies. At this time the dissertation committee is formally constituted and usually has the same membership as the pre-dissertation advisory committee, although this is not mandatory. For example, should the student's research area change, it may be appropriate to replace one or more of the original advisory committee members with faculty better qualified to provide research mentoring in the new area of inquiry. The Advancement to Candidacy Form certifies that the student has successfully completed the preliminary

examination and lists the proposed chair and members of the dissertation committee. Upon approval, the College of Graduate Studies will notify the applicant of advancement to candidacy.

Before an applicant is officially admitted to candidacy for the Ph.D. degree, the student must have satisfied the following requirements:

1. Advancement to Candidacy and degree plan forms must be filed by the deadlines published in the Graduate Catalog and the registration guide (mtsu.edu/registration/registration-guide.php). The Advancement to Candidacy Form may not be filed in the same semester in which the student is to be graduated.
2. The student must have at least a 3.25 grade point average on all coursework listed on the degree plan as well as any other graduate work undertaken at Middle Tennessee State University within the specified time limit (ten years). Grades of D or F are not accepted for any graduate degree credit, and no more than seven (7) hours of C grade may count toward Ph.D. degree requirements. However, all C, D, and F grades will be included in the student's GPA computation.

Defense of Dissertation

Upon submission of the completed dissertation, the doctoral candidate who has successfully completed all requirements for the degree will be scheduled by the chair of her/his dissertation committee, in consultation with the other committee members, to defend the dissertation. The College of Graduate Studies must be notified of the dissertation title, date, time, and location of the defense at least two weeks prior to the date of the examination. The defense is open to all members of the University community who wish to attend. The dissertation defense is administered by the dissertation committee according to program guidelines. Successful defense of the dissertation must be attested to in writing by all members of the dissertation committee.

Residency

Residency requirements are established by each program, pending Graduate Council approval.

Time Limit

There is a ten-year limit for completing all Ph.D. degree requirements. Thus, all coursework offered toward the doctoral degree as well as the dissertation must be completed within ten years after matriculation (i.e., the first semester of enrollment). All graduate level coursework considered for transfer credit into the Ph.D. program must be degree-applicable and have been completed within seven (7) years prior to the first enrollment in the Ph.D. program.

Transfer Credits

Only coursework completed at an accredited institution that would count toward the doctorate there will be considered for approval as transfer credit toward the Doctor of Philosophy coursework requirement at MTSU. Additional information on transfer credit may be found in the section on academic regulations.

Intent to Graduate

By the end of the second full week of the term in which the student intends to graduate, or by the end of the first week of the Summer June Term (for August graduation), the candidate must file an Intent to Graduate form (www.mtsu.edu/graduate/intent.php) with the College of Graduate Studies, and complete the College of Graduate Studies exit survey. All degree requirements must be completed prior to the date of graduation.

Doctor of Education Degree

Middle Tennessee State University offers the Doctor of Education (Ed.D.) degree in Assessment, Learning, and School Improvement. The Ed.D. degree is offered for the purpose of developing doctoral-level expertise in applying educational research to real-world educational environments in order to improve the quality of learning across the student population. Above all, the Ed.D. recipient from MTSU is an educational scholar who has acquired the advanced academic skills needed to be a change leader in contemporary educational settings by assessing challenges, researching best practices, and applying those to student learning in order to bring about school improvement.

Admission

General admission requirements for the Ed.D. degree may be found in the admission section of this catalog. Applicants for admission to this degree objective must hold a master's degree.

University Requirements Leading to the Ed.D. Degree

Following are the minimum University requirements that must be met to be eligible for the granting of the Ed.D. degree.

General Course and Credit Requirements

The required minimum is 60 semester hours of coursework with at least two-thirds of the program at the 7000 level. No more than 12 semester hours of dissertation research (course 7640) may be applied toward this 60-hour requirement.

The 60-credit requirement must include the following:

- a. At least 48 hours in discipline-specific coursework. Undergraduate or dual-listed 4000/5000 courses (or their equivalents) cannot be used toward this requirement.
- b. At least 12 semester hours for the dissertation research (course 7640).

NOTE: Once an Ed.D. student has begun taking dissertation research, she/he is expected to enroll in at least 1 semester hour of dissertation research each term (excluding summers) until the dissertation is completed. Failure to maintain continuous enrollment will require the student to apply for readmission to the program. Readmission is not guaranteed.

Additional Program Requirements

Each doctoral program establishes degree requirements that are specific to that discipline and may be in excess of the minimum University requirements. Students should consult the appropriate graduate program section in this catalog. The graduate program director of each graduate program may also specify additional requirements above the required sixty (60) hours for the Ed.D., such as prerequisites, publication of a research-based article, and/or presentation of a research-based conference paper.

Degree Plan

At the time of admission student should complete a degree plan in consultation with the graduate program director. The degree plan must be approved by the student's advisor and submitted to the College of Graduate Studies. The degree plan may be amended as necessary by submission of a Change to Degree Plan form.

Examinations

Each Ed.D. student may be required to take a set of examinations administered by the graduate program. A less than satisfactory outcome (including a fail decision on any component of the examinations) may result in additional academic requirements and/or a re-examination. A re-examination may be given only once. A second fail decision on any component of the examinations results in a recommendation to the dean of the College of Graduate Studies for academic dismissal. The student may appeal the dismissal recommendation, for cause, to the Appeals

Subcommittee of the Graduate Council via the chair of the Graduate Council or the dean of the College of Graduate Studies.

Qualifying Examinations: Each Ed.D. student may be required to take a qualifying examination. The qualifying examination is administered by a graduate program early in the student's doctoral program, often after the first year of the doctoral program. Students should consult their advisors as to the individual program's policy in the timing and content of the examination. It may assess overall knowledge upon entry into the program or prior to entering the dissertation phase. To be eligible to take this examination, the student must be fully admitted to the College of Graduate Studies and to the graduate program. Programs may have additional requirements or assess students by different means. The student should contact the individual program to determine qualifying examination requirements.

Preliminary Examination: The Ed.D. student may also be required to pass an additional or subsequent written and/or oral examination. This examination is referred to as the Preliminary Examination. The student must be in good academic standing and must have at least a 3.25 grade point average in all graduate work. The preliminary examination is intended to assess whether a candidate is qualified to continue in a doctoral program, advance to candidacy, and pursue dissertation work.

All written examinations are given at least one month before the close of the Fall, Spring, and/or Summer semesters. Permission for the Ed.D. student to schedule the preliminary examination requires the approval of the student's advisor and the graduate program director. The student should contact the individual program to determine the deadlines for submitting these applications.

A satisfactory or passing performance on the written and/or oral examinations means that the candidate is qualified to continue the program as planned.

The graded written examinations are maintained by the program for a period of five (5) years and are available to the student upon request.

Advancement to Candidacy

After a student successfully completes the preliminary examination, the program files an Advancement to Candidacy Form with the dean of the College of Graduate Studies. At this time the dissertation committee is formally constituted and usually has the same membership as the pre-dissertation advisory committee, although this is not mandatory. For example, should the student's research area change, it may be relevant to replace one or more of the original advisory committee members with faculty better qualified to provide research mentoring in the new area of inquiry. The Advancement to Candidacy Form certifies that the student has successfully completed the preliminary examination and lists the proposed chair and members of the dissertation committee. Upon approval, the College of Graduate Studies will notify the applicant of advancement to candidacy.

Before an applicant is officially admitted to candidacy for the Ed.D. degree, the student must have satisfied the following requirements:

1. Advancement to Candidacy and degree plan forms must be filed by the deadlines published in the Graduate Catalog and registration guide. The Advancement to Candidacy Form may not be filed in the same semester in which the student is to be graduated.
2. The student must have at least a 3.25 grade point average on all coursework listed on the degree plan as well as any other graduate work undertaken at Middle Tennessee State University within the specified time limit (ten years). Grades of D or F are not accepted for any graduate degree credit, and no more than seven (7) hours of C grade may count toward Ed.D. degree requirements. However, all C, D, and F grades will be included in the student's GPA computation.

Defense of Dissertation

Upon submission of the completed dissertation, the doctoral candidate who has successfully completed all requirements for the degree will be scheduled by the chair of her/his dissertation committee, in consultation with the other committee members, to defend the dissertation. The College of Graduate Studies must be notified of the dissertation title, date, time, and location of the defense at least two weeks prior to the date of the examination. The defense is open to all members of the University community who wish to attend. The dissertation defense is administered by the dissertation committee according to program guidelines. Successful defense of the dissertation must be attested to in writing by all members of the dissertation committee.

Residency

Residency requirements will be established by each program, pending Graduate Council approval.

Time Limit

There is a ten-year limit for completing all doctoral degree requirements. Thus, all coursework offered toward the doctoral degree as well as the dissertation must be completed within ten years after matriculation (i.e., the first semester of enrollment).

NOTE: The Ed.D. in Assessment , Learning, and School Improvement is a cohort program and is intended to be completed as part of a cohort of students over a three-year period. Students who withdraw or otherwise fail to continue with their cohort must apply for readmission. Readmission is not guaranteed.

Intent to Graduate

By the end of the second full week of the term in which the student intends to graduate, or by the end of the first week of the Summer June Term (for August graduation), the candidate must file an Intent to Graduate form (www.mtsu.edu/graduate/intent.php) with the College of Graduate Studies, and complete the College of Graduate Studies exit survey. All degree requirements must be completed prior to the date of graduation.

General Information for Specialist and Master's Students

In addition to the materials found below, the reader should refer to the Glossary section in this catalog for additional important information relative to graduate education at MTSU.

Admission Requirements

Applicants must meet the admission requirements for degree-seeking students and submit any additional materials required by the major program of study. (See relevant department for specific requirements.)

Admission is granted to a specific program of study, and a student may not change the major, the concentration, or the minor without a recommendation by the relevant graduate advisor(s) and the written approval of the dean of the College of Graduate Studies.

All applicants must hold a bachelor's degree from an accredited university. In addition, applicants for the Specialist in Education (Ed.S.) degree must also hold a master's degree from an accredited university.

Comprehensive Examinations

The comprehensive examinations are scheduled by each department during the last part of the semester in which the student expects to graduate. These may be oral, written, or both. This test is not merely a reexamination of coursework, but it is an assessment of the candidate's ability to integrate scholarly information linking the major and related fields. The comprehensive examinations may be taken no more than twice.

Degree Plan

The degree plan is established in consultation with the graduate advisor and sets out the curricular plan to follow for the purpose of graduation. The degree plan must be filed and approved prior to beginning the program. The form is approved by the pertinent graduate program personnel (e.g., major professor, graduate advisor, etc.) and the dean of the College of Graduate Studies (or designee).

M.A.T. and M.S.T. degree plans must also be signed by the dean of the College of Education or an appropriate representative if licensure is being sought. The degree plan for the M.Ed. requires that the student have a professional license to teach and thus must also be signed by the dean of the College of Education or an appropriate representative.

Degree Plan Change

If for any reason the courses listed on the degree plan cannot be followed, a revision to the degree plan must be filed with the College of Graduate Studies. This must be approved by the major professor, reader(s), and/or faculty advisors.

Faculty Advisors

After admission, a degree-seeking student is assigned faculty advisors in the major and minor areas. The student should consult these advisors for program planning and optimal course scheduling.

Intent to Graduate

By the end of the second full week of the term in which the student intends to graduate, or by the end of the first week of the Summer June Term (for August graduation), the candidate must file an Intent to Graduate form (www.mtsu.edu/graduate/intent.php) with the College of Graduate Studies, and complete the College of Graduate Studies exit survey. All degree requirements must be completed prior to the date of graduation.

Thesis

The thesis in final form must be electronically submitted no later than the date specified in the University Academic Calendar, which is approximately six weeks before graduation. It must be approved by the major professor, the reader(s), and the department chair prior to submission. Guidelines for electronic submission of theses are found in the College of Graduate Studies Thesis and Dissertation Manual. Guidelines for the thesis vary from department to department. While the responsibility for the technical quality and content of the thesis or dissertation lies in the graduate committee, the College of Graduate Studies imposes format requirements to ensure an appropriate appearance for your thesis or dissertation and recognizes the quality of the product you have produced by accepting it. Final responsibility for the thesis or dissertation lies with the author. The University reserves the right to refuse any manuscript that is not in agreement with the **MTSU Thesis and Dissertation Manual** formatting guidelines, is not in suitable condition for archiving, is in any form plagiarized or fabricated, or does not meet the quality standard expected of a graduate thesis. Thus a thesis not meeting standards may be rejected by the dean of the College of Graduate Studies and graduation delayed.

NOTE: Once the student has begun taking thesis research, he/she is expected to enroll in at least 1 semester hour of thesis research (course 6640) until the thesis is completed.

Specialist in Education Degree

Middle Tennessee State University offers the Specialist in Education (Ed.S.) degree in Administration and Supervision and in Curriculum and Instruction. The Ed.S. degree is provided specifically for teachers, counselors, and administrators wishing to pursue graduate study beyond the master's level. The Ed.S. in Administration and Supervision and the Ed.S. in Curriculum and Instruction are available through the Womack Educational Leadership Department. The Ed.S. in Curriculum and Instruction with a concentration in School Psychology is offered by the Department of Psychology.

Common Requirements for All Specialist Degree Programs

All specialist candidates must

1. complete all applicable coursework **after** receipt of the master's degree.
2. file a degree plan with the College of Graduate Studies prior to beginning the program. No courses at the 5000 level or lower may apply toward the specialist degree.
3. successfully complete a written (and/or oral) comprehensive examination. The examination may be taken no more than twice.
4. complete all specific graduate program requirements. These additional specific degree requirements are found under the applicable department.

Second Specialist Degree from MTSU

An individual who has received one specialist degree from MTSU may obtain a second specialist degree with a minimum of 24 additional semester hours of graduate coursework earned at MTSU if approved in advance by the graduate program and the graduate dean. No transfer coursework is accepted towards the second specialist degree. All specific course requirements must be met for the second degree (except FOED 7060 - Seminar in Educational Foundations and SPSE 7130 - The Curriculum: Structures and Functions), including the written comprehensive examinations and thesis (if relevant). All semester hours must be earned after the first specialist degree has been conferred.

The Master's Program

Middle Tennessee State University offers graduate degrees and certificate programs encompassing over 80 areas of study. These include the Master of Accountancy (M.Acc.), Master of Arts (M.A.), the Master of Arts in Teaching (M.A.T.), the Master of Business Administration (M.B.A.), the Master of Business Education (M.B.E.), the Master of Criminal Justice (M.C.J.), the Master of Education (M.Ed.), the Master of Fine Arts (M.F.A.), the Master of Library Science (M.L.S.), the Master of Music (M.M.), the Master of Science (M.S.), the Master of Science in Nursing (M.S.N.), the Master of Science in Teaching (M.S.T.), the Master of Professional Studies (M.P.S.), and the Master of Social Work (M.S.W.).

Common Requirements for all Master's Degree Programs

All master's candidates must

1. satisfactorily complete the undergraduate prerequisites.
2. complete a minimum of 30 (or more) semester hours of graduate coursework. No more than 30 percent of the total degree hours may be dually listed as undergraduate/graduate hours. No undergraduate courses may apply toward the graduate program requirements. If a thesis is required, normally no more than three hours will apply toward the 30 (or more) semester hour program requirement. However, additional semester hours of thesis research (6640) may be taken and will appear on the student's transcript.
3. file a degree plan with the College of Graduate Studies prior to beginning the program.
4. successfully complete a written (and/or oral) comprehensive examination; the examination may be taken no more than twice.
5. complete all specific graduate program requirements.

Program Leading to the M.Acc. Degree

A Master of Accountancy (M.Acc.) degree program is offered by the Department of Accounting in the Jennings A. Jones College of Business. Specific program requirements may be found under Accounting.

Programs Leading to the M.A. Degree

Departments offering programs leading to the Master of Arts degree include Economics and Finance, English, History, Political Science, Psychology, and Sociology and Anthropology, as well as the College of Liberal Arts. Normally, the Master of Arts degree requires a thesis; however, graduate programs in English, Economics, History, and International Affairs (Political Science) include a nonthesis option requiring more than 30 semester hours. Specific program requirements may be found under the appropriate program.

Program Leading to the M.A.T. Degree

The Department of Foreign Languages and Literatures offers the Master of Arts in Teaching in Foreign Languages. The degree should be pursued by those individuals interested in teaching. Admission is open to licensed teachers as well as those seeking initial licensure. Specific program requirements may be found under the Foreign Languages program.

Program Leading to the M.B.A. Degree

The Master of Business Administration program includes courses in the following six areas of business: accounting, economics, finance, management, marketing, and information systems. Specific degree requirements are found under Business Administration.

Program Leading to the M.B.E. Degree

A Master of Business Education (M.B.E.) degree program is offered by the Department of Marketing in the Jennings A. Jones College of Business. Specific degree requirements are found under Business Education.

Program Leading to the M.C.J. Degree

The Master of Criminal Justice degree program is offered by the Department of Criminal Justice Administration. Students may seek professional employment in the operational agencies in the field of criminal justice or pursue relevant research or teaching positions.

Programs Leading to the M.Ed. Degree

Departments offering programs leading to the Master of Education degree include Womack Educational Leadership and Elementary and Special Education. The M.Ed. degree provides programs of study in Administration and Supervision, Curriculum and Instruction, Professional Counseling, Literacy, and Special Education. Specific degree requirements are found under Administration and Supervision, Advanced Studies in Teaching and Learning, Curriculum and Instruction, Literacy, Professional Counseling, and Special Education.

Program Leading to the M.F.A. Degree

The Master of Fine Arts (M.F.A.) with a major in Recording Arts and Technologies is offered by the Department of Recording Industry to prepare practitioners in the field of audio and music recording and production for advanced work in an integrated electronic media environment. Specific degree requirements are found under Recording Arts and Technologies.

Program Leading to the M.L.S. Degree

The Master of Library Science (M.L.S.) is offered by the Womack Educational Leadership Department. Specific degree requirements are found under Library Science.

Program Leading to the M.M. Degree

The Master of Music (M.M.) is offered by the School of Music. Specific degree requirements are found under Music.

Program Leading to the M.P.S. Degree

MTSU offers in collaboration with other Tennessee institutions the Master of Professional Studies for individuals seeking interdisciplinary training within the social sciences and their current profession. Specific degree requirements are found under Professional Studies.

Programs Leading to the M.S. Degree

The University offers the Master of Science degree in the areas of Aeronautical Science, Biology, Chemistry, Computer Science, Engineering Technology, Exercise Science, Finance, Health and Human Performance, Horse Science, Information Systems, Leisure and Sport Management, Management, Media and Communication, Mathematics, and Professional Science. Specific degree requirements are found under the applicable program. Normally, the Master of Science degree requires a thesis; however, graduate programs in Computer Science, Exercise Science, Health and Human Performance, Engineering Technology, Leisure and Sport Management, Management, Media and Communication, Professional Science, Horse Science, and Mathematics include a nonthesis option requiring more than 30 semester hours. (Specific program requirements may be found under the appropriate program.)

Program Leading to the M.S.N. Degree

The Master of Science in Nursing Degree (M.S.N.) is offered. Specific program requirements may be found under Nursing.

Program Leading to the M.S.T. Degree

The Master of Science in Teaching degree is offered by the Department of Mathematical Sciences. The degree should be pursued by those individuals interested in teaching. Admission is open to licensed teachers as well as those seeking initial licensure. Specific degree requirements are found under Mathematics.

Program Leading to the M.S.W. Degree

The Master of Social Work degree program is a collaborative program with Middle Tennessee State University, Tennessee State University, and Austin Peay State University. Specific degree requirements are found under Social Work.

Second Master's Degree from MTSU

An individual who has received one master's degree from MTSU may obtain a second master's degree with a minimum of 24 additional semester hours of coursework earned at MTSU if approved in advance by the graduate program director and the graduate dean. No transfer coursework is accepted towards the second master's degree. All specific course requirements must be met for the second degree, including the written comprehensive examinations and thesis (if relevant). All semester hours to be applied toward the second degree must be earned after the first master's degree has been conferred.

Intent to Graduate

By the end of the second full week of the term in which the student intends to graduate, or by the end of the first week of the Summer June Term (for August graduation), the candidate must file an Intent to Graduate form (www.mtsu.edu/graduate/intent.php) with the College of Graduate Studies, and complete the College of Graduate Studies exit survey. All degree requirements must be completed prior to the date of graduation.

Graduate Certificate Programs

Graduate certificate programs provide advanced study beyond the baccalaureate degree and are intended as both professional development and as an intermediate step towards a desired graduate degree. Middle Tennessee State University offers graduate certificates in College and University Teaching, Family Nurse Practitioner, Gerontology, Health Care Management, Museum Management, Nursing Administration, Nursing Education, United States Culture and Education, and Women's and Gender Studies. The Gerontology, Health Care Management, and United States Culture and Education certificates are interdisciplinary programs involving courses and faculty in multiple MTSU departments. The certificate in United States Culture and Education is open only to international students.

Requirements

Prospective students should apply to the College of Graduate Studies. Once a student is admitted to the college, his or her application is transmitted to the director of the individual certificate program for admission consideration. For admission to the interdisciplinary graduate certificate programs in Gerontology and Health Care Management, students must possess a bachelor's degree with an undergraduate grade point average of 2.75 (4.0 scale) and are required to submit a letter demonstrating their interest, detailing prior field experience, and outlining career goals and aspirations.

Students enrolled in the certificate program must comply with existing policies applicable to all graduate programs at MTSU. The time limit for use of credit toward the certificate is six years from the date of enrollment in the earliest course applied toward the certificate, including transferred courses. Students must maintain a cumulative graduate grade point average of 3.00 in courses leading to the certificate. Students may transfer up to six (6) credit hours of approved coursework into the certificate program.

Graduate Certificates

- College and University Teaching
- Museum Management
- Nursing, Advanced Practice: Family Nurse Practitioner, M.S.N.
- Nursing Administration Certificate (***Admission is closed. This program will become inactive Spring 2018.***)
- Nursing Education Certificate (***Admission is closed. This program will become inactive Spring 2018.***)

Interdisciplinary Certificate Programs

- Gerontology
- Health Care Management
- United States Culture and Education
- Women's and Gender Studies

Gerontology Certificate

Ron Aday, Program Director
(615) 898-2125
Ronald.Aday@mtsu.edu

The certificate program in Gerontology provides supplementary education in gerontology for students preparing for careers in a broad range of positions. This program is also designed to give those already working in the field an opportunity to enrich existing skills and knowledge and to provide further opportunities for career advancement.

Admission Requirements

Admission to the graduate certificate program requires an earned bachelor's degree from an accredited university or college with an undergraduate grade point average of 2.75 or higher (4.0 scale).

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

Applicant must

1. submit application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit official transcripts of all previous college work;
3. submit a letter demonstrating their interest, detailing prior field experience, and outlining career goals and aspirations.

Certificate Requirements

Candidate must

1. complete 15 hours of graduate courses (see Curriculum section below for specifics);
2. maintain a cumulative graduate grade point average of 3.00 in courses leading to the certificate.

Curriculum: Gerontology

Candidate must complete 15 hours in the following course of study:

Core Requirement (3 hours)*

- PSY 5610 - Adult Psychology and Aging **3 credit hours** OR
- SOC 5020 - Sociology of Aging **3 credit hours** OR
- SOC 6550 - Seminar on Aging **3 credit hours**

***Note:**

All students are required to complete at least one core course.

Electives (12 hours)

The remaining hours are to be selected from the following courses in conjunction with career goals and aspirations. Additional core courses may be completed as electives.

- CDFS 5390 - Families in Later Life **3 credit hours**
- CDFS 5391 - Aging Health and Development **3 credit hours**
- CDIS 5800 - Speech and Language Disorders in the Adult Population **3 credit hours**
- LSM 5380 - Disabilities and Diversity in Leisure, Sport and Tourism **3 credit hours**
- LSM 5470 - Leisure and Aging **3 credit hours**
- NFS 5210 - Nutrition in Aging **3 credit hours**
- PSY 5610 - Adult Psychology and Aging **3 credit hours**
- PSY 5630 - Death and Dying **3 credit hours**
- SOC 5020 - Sociology of Aging **3 credit hours**
- SOC 5030 - Topics in Gerontology **3 credit hours**
- SOC 5040 - Health Care Delivery Issues **3 credit hours**
- SOC 5800 - Special Projects **1 to 3 credit hours**
- SOC 6510 - Independent Study **3 credit hours**
- SOC 6550 - Seminar on Aging **3 credit hours**
- SOC 6661 - Program Evaluation **3 credit hours**
- SOC 6670 - Mental Health and Aging **3 credit hours**
- SOC 6900 - Practicum: Applied Analysis **3 credit hours**

Program Notes

Students with little or no experience working with the elderly are encouraged to complete SOC 6900 - Practicum: Applied Analysis. Special projects, independent study, and thesis research may also be counted toward the certificate with approval of the program director.

Students may transfer up to six (6) credit hours of approved coursework into the certificate program. The time limit for use of credit toward the certificate is six years from the date of enrollment in the earliest course applied toward the certificate, including transferred courses.

Candidate must file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the semester in which candidate intends to graduate.

Women's and Gender Studies Certificate

Vicky McLean, Program Director
(615) 898-5910
Vicky.Maclean@mtsu.edu

The certificate program in Women's and Gender Studies seeks to provide students with knowledge of fundamental issues in sex and gender and how these are reflected in culture across time; how they shape institutions as well as personal experience; how they interact with issues such as ethnicity, race, and socioeconomic class; how new ways of thinking about gender challenge the processes by which knowledge about human beings and our behavior is acquired, interpreted, and transmitted; and how to do research within the field and apply this knowledge to one's personal and professional life.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admission to the graduate certificate program requires

1. an earned bachelor's degree from an accredited university or college;
2. an acceptable grade point average in all college work taken.

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

Applicant must

1. submit application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit official transcripts of all previous college work;
3. submit a current resume;
4. submit a letter of interest and goals;
5. successfully complete "Introduction to Women's studies" or an equivalent course or have experience deemed acceptable by the admissions committee;
6. submit two letters of reference.

Certificate Requirements

Candidate must

1. complete 18 hours of graduate courses, with at least 12 hours at the 6000 level (see Curriculum section below for specifics);
2. maintain a cumulative graduate grade point average of 3.00 in courses leading to the certificate.

Curriculum: Women's and Gender Studies

Candidate must complete 18 hours in the following course of study:

Required Courses (9 hours)

- WGST 6000 - Feminist Theory **3 credit hours**
- WGST 6010 - Feminist Methods **3 credit hours**
- WGST 6020 - Internship in Women's and Gender Studies **3 credit hours** OR
- WGST 6021 - Directed Reading and Research **3 credit hours**

Electives (9 hours)

Approved courses must be taught by a WGST graduate faculty member to count towards the certificate.

5000-level Courses

- CDFS 5140 - Violence in the Family **3 credit hours**
- HIST 5775 - U.S. Women's History **3 credit hours**
- HIST 5810 - History of Women in the Third World **3 credit hours**
- MUHL 5810 - Women in Music **3 credit hours**
- PSY 5620 - Psychology of Women **3 credit hours**
- SOC 5140 - Violence in the Family **3 credit hours**
- SOC 5150 - Topics in Sociology **3 credit hours**
- SOC 5361 - Contemporary Issues in Women's Health **3 credit hours**

6000/7000-level Courses

- BCED 6680 - Women and Minorities in Business **3 credit hours**
- ENGL 6455 - Special Topics in Women's Literature **3 credit hours** (approved topics only)
- ENGL 6460 - Studies in Contemporary Drama **3 credit hours** (approved topics only)
- ENGL 6500 - Selected Topics in Literature and Language **3 credit hours** (approved topics only)
- ENGL 7455 - Special Topics in Women's Literature **3 credit hours** (approved topics only)
- ENGL 7460 - Studies in Contemporary Drama **3 credit hours** (approved topics only)
- ENGL 7500 - Selected Topics in Literature and Language **3 credit hours** (approved topics only)
- HIST 6104 - Seminar: Topics in American History **3 credit hours** (approved topics only)
- HIST 6204 - Seminar: Topics in European History **3 credit hours** (approved topics only)
- HIST 7104 - Seminar: Topics in American History **3 credit hours** (approved topics only)
- HIST 7204 - Seminar: Topics in European History **3 credit hours** (approved topics only)
- PSY 6730 - Literature Review and Reading in Psychology: Personality **1 to 3 credit hours**
- SOC 6540 - Topics in Crime and Deviance **3 credit hours** (approved topics only)
- SOC 6545 - Topics in Gender **3 credit hours** (approved topics only)
- SOC 6650 - Contemporary Social Issues **3 credit hours** (approved topics only)
- WGST 6000 - Feminist Theory **3 credit hours**
- WGST 6010 - Feminist Methods **3 credit hours**
- WGST 6020 - Internship in Women's and Gender Studies **3 credit hours**
- WGST 6021 - Directed Reading and Research **3 credit hours**

Program Notes

Students may transfer up to six (6) credit hours of approved coursework into the certificate program. The time limit for use of credit toward the certificate is six years from the date of enrollment in the earliest course applied toward the certificate, including transferred courses.

Candidate must file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the semester in term in which candidate intends to graduate.

Libraries/Archives/Centers

Numerous library and archive resources are located on the MTSU campus. Copying of materials housed in these facilities is permitted only in compliance with federal copyright statutes and in accordance with departmental rules and regulations.

Libraries

Center for Educational Media

The Center for Educational Media, located in the Learning Resources Center and the College of Education building consists of several related units and facilities, including Audio/Visual Services, a television studio, a satellite and webcasting center, and the Education Resource Channel @ Middle Tennessee, one of MTSU's two education access television stations.

Audio/Visual Services maintains an inventory of audio/visual equipment for faculty check-out, repairs campus audio/visual equipment, performs equipment set-ups for events, provides dubbing services, records off-air programming for classroom use, and supports satellite and webcasting services. Audio/Visual Services also offers professional video production services for MTSU faculty and administrators, including studio production, remote production, postproduction, satellite uplinks and downlinks, and webcasts.

The Satellite and Webcasting Center offers quality educational programming via satellite to K-12 schools in many rural Tennessee counties and via cable television to viewers in Rutherford and five other middle Tennessee counties. Programs are also webcast to viewers across the state. The satellite facilities can be scheduled by units across campus for local, statewide, or national broadcasts of special events and programs. Both digital and analog C-band transmission options are available.

The Education Resource Channel @ Middle Tennessee delivers classroom enrichment and professional development programs to K-12 schools and general educational programming to the public. The channel serves middle Tennessee via Comcast (Rutherford County), DTC Communications, and AT&T U-Verse. Programs include MTSU productions and licensed programs from non-profit organizations and commercial educational media vendors.

Albert Gore Research Center

The Albert Gore Research Center serves the campus community and members of the public interested in American politics, the history of MTSU, veterans' and military history, regional history, and equine studies. You can visit the center in TODD 128 weekdays from 9:00 am to 4:00 pm and online at gorecenter.mtsu.edu/.

The Albert Gore Research Center has especially strong collections documenting **American government and political activism**. It holds the papers of Albert Gore Sr., (MTSU '32) from his years in the U.S. House and Senate and the records of Representative Bart Gordon (MTSU '71), Representative LaMar Baker, Representative Bill Boner (MTSU '67), Representative Jim Cooper, and Representative Zach Wamp. Tennessee state legislators' materials include the records of LaMar Baker, John Bragg (MTSU '40), Frank Buck, Jim Cummings, Buford Ellington, John Hood (MTSU '54, '74), and Andy Womack (MTSU '70). The center also holds the records of numerous political activists and citizen groups. The center is a member of the Association of Centers for the Study of Congress and a leader in the archiving of Congressional electronic records.

As the **institutional archive for Middle Tennessee State University**, the center holds the official records of MTSU programs and departments as well as the papers of alumni, faculty, staff, and campus organizations. A rich collection of photographs documents all aspects of MTSU campus life from its founding in 1911 to the present. MTSU publications such as yearbooks and media productions are also part of the University archive.

Materials related to **American veterans and the home front** document the American military experience from the Civil War to the present. Collections related to World War II are especially rich, and include the papers of and oral histories with veterans of that war as well as documents and artifacts from the Tennessee Maneuvers. The center is a partner in the Library of Congress Veterans History Project.

The research center has significant collections about **local history and culture**. Many organizations and businesses have chosen the center to preserve their history. **Middle Tennessee women** hold a prominent place in the center's collections in the records of individual women and women's organizations. **The Margaret Lindsley Warden Library**

for Equine Studies is an unparalleled resource for the history of horse breeding and horse sports in the region and nation.

James E. Walker Library

The James E. Walker Library supports a quality education at MTSU. The centrally located facility is a center for student learning support. The library has the study spaces, technology, and full range of services to assist students as they complete their work. Library staff provide expert help to support course assignments, term papers, and student research. The Technology Services Desk staff assist students in accessing the campus network with their personal laptops, access to campus online course systems, and services as well as the loan of laptops. The reference staff assist students in conducting research in the classroom as well as individually. The library has the information needed for research and learning in the library collections, with a significant portion accessible on the Web for 24/7 access. To complete the student learning support options, the Writing Center, Tutoring Spot, and the Adaptive Technology Lab are also located in the library.

Special features of the library include a Starbucks coffee shop, two instruction rooms for learning research skills, presentation practice rooms, group study rooms for collaborative work, and designated quiet zones for collaborative work and/or individual study. Services include a Digital Media Studio and MAC lab with specialized hardware and software; a Technology Services Desk to help students with Pipeline, D2L, wireless connectivity, laptops, and other equipment and printing; Special Collections; Curriculum Collection to support teacher education; and a listening and viewing space to access the library's music and video collection. Students will find white boards, scanners, printers, and over 400 computers located in the building. Walker Library is open extended hours during the academic term. Students can request help in person at the Reference Desk, by phone, email, instant messaging, or text. Students use their MTSU ID cards to borrow books, check out equipment, or reserve rooms while their PipelineMT accounts provide access to online information resources from off campus.

More information can be found on the library's website at library.mtsu.edu/.

Women's and Gender Studies Library

The Women's and Gender Studies Program, located in JUB 308, maintains a collection of books and other research materials related to women's and gender studies. Most volumes circulate. (See also Women's and Gender Studies Minor.)

Centers

Center for Health and Human Services

The Center for Health and Human Services is a federation of academic units that share the common goal of preparing the health and human services workforce in Tennessee. Coordinated by the chairholder of the Adams Chair of Excellence in Health Care Services, the center encourages quality interdisciplinary education, research, and service programs in health and human service areas. The center also collaborates with public agencies and private not-for-profit organizations to develop and implement programs designed to improve the health of the middle and greater Tennessee community. MTSU programs affiliated with this center include Aging Studies; School of Nursing; Departments of Psychology, Sociology and Anthropology, Social Work, Health and Human Performance, and Human Sciences; Communication Disorders; Pre-professional Health Sciences; and graduate studies in gerontology and health care management.

Center for Historic Preservation

One of two Centers of Excellence at MTSU, the Center for Historic Preservation (www.mtsuhistpres.org/) was established in 1984. The center joins with communities to interpret and promote their heritage assets through education, research, and preservation. With the assistance of both graduate and undergraduate students, we practice "boots-on-the-ground" historic preservation. We go to property owners, communities, and elected officials and listen carefully to what they wish to achieve with their history. We then work together-with what we call reciprocal partnerships-to craft a plan to move forward, helping our partners integrate their pasts, historic sites, and traditions

into tools for stronger communities, enhanced economic opportunities, and more meaningful engagement with their fellow citizens on what is significant to them, and in turn to the state and nation. Providing leadership and assistance on a local, state, regional, and national basis, the center's work falls within five initiatives.

Rural preservation recognizes the unique heritage, resources, and problems of rural areas and small towns. The overall goal is to create a heritage infrastructure for successful, long-term project development in small towns that have outstanding resources but lack the expertise to use heritage resources for cultural and economic improvement. The Tennessee Century Farms Program, established in 1985 in partnership with the Tennessee Department of Agriculture, is centered on farms that have been in the same family for at least 100 years. We approve applications for the program and manage a Facebook page that is very popular with Century Farm families. The Rural African American Church Project, established in 1997 in partnership with African American heritage groups and the National Trust for Historic Preservation, is a continuing project that documents the state's historic black churches.

Heritage education addresses the use of primary sources, including cultural heritage resources, as across-the-disciplines teaching tools in the K-12 grades. Much of this work is accomplished through the center's statewide Teaching with Primary Sources-MTSU program, a partnership with the Library of Congress (library.mtsu.edu/tps). TPS-MTSU works with school systems, community heritage organizations, and higher education teacher-training programs to assist in developing and presenting materials that meet curriculum standards. Serving educators and students at all levels MTSU partners with other MTSU departments and educational institutions throughout the state, such as the Tennessee Historical Society and the East Tennessee History Center.

The Tennessee Civil War National Heritage Area (www.tncivilwar.org/) was created by Congress in 1996. The Heritage Area focuses on the preservation, interpretation, and heritage development of the multiple legacies of the Civil War and Reconstruction in Tennessee. The center is one of the only university units in the nation to serve as the administrative head of a National Heritage Area, which are partnership units of the National Park Service. The Heritage Area provides professional services to institutions, agencies, and property owners across the state and develops funding partnerships with groups, governments, and institutions, which work with the center to establish joint projects and programs of long-lasting benefit to the state and nation. The Heritage Center of Murfreesboro and Rutherford County, located just off the square in Murfreesboro, is a partnership with the Main Street downtown revitalization program. The Heritage Center features a central exhibition on the local Civil War story and serves as a learning laboratory for graduate and undergraduate students, who assist in welcoming visitors, giving downtown walking tours, and creating exhibitions.

Heritage Diversity focuses on incorporating the stories and traditions of all Tennesseans into the history and preservation of the state. Identifying, documenting, and assisting in the interpretation of historic African American schools, cemeteries, farmsteads, and businesses and contributions to the arts are a part of this initiative. National Register documentation of Tennessee, Alabama, and other southern sites associated with the Civil Rights movement are continuing projects. Interpretation and preservation of the Trail of Tears is also a top priority. The center is in its third year partnering with the National Park Service's National Trails Intermountain Region to conduct a comprehensive, nine-state survey to identify and document historic buildings associated with the Trail of Tears National Historic Trail. The final report will serve as a planning tool for future preservation and interpretation initiatives for the Trail. Several center staff research and write about Tennessee women's history during the Civil War, Reconstruction, and Progressive eras.

Civic Engagement includes the national American Democracy Project (ADP) of the American Association of State Colleges and Universities. The ADP is an initiative that advocates for civic learning in all disciplines of higher education to prepare young people for engaged citizenship in our democracy, so that they can become informed members of their communities. A program of the University Provost's office at MTSU since 2003, ADP has completed its first full year with the center for Historic Preservation. ADP's efforts to advance civic learning, engagement, and responsibility in our democracy are fueled through partnerships and parallel the community-centered preservation work at the core of the mission of the center. Both the center and ADP are founded on the principle that democratic action and historic preservation are their very best when locally driven and broadly inclusive. The center provides ADP with exciting networks and support for important accomplishments.

Graduate-level staff teach historic preservation courses each year for the Department of History and direct a number of theses and dissertations. The center hosts graduate assistants from the Ph.D. program in Public History as well as those studying at the M.A. level. Graduate and undergraduate students who work at the center assist staff on a variety of applied research and public service projects, gaining valuable interdisciplinary experiences to supplement their in-class training.

The center creates and supports several digital humanities initiatives and has a strong presence on social media. ***The Tennessee Encyclopedia of History and Culture*** Online Edition is a partnership among the center, the Tennessee Historical Society, and the University of Tennessee Press. The encyclopedia Web site is a comprehensive reference for the state's history. ***Southern Places***, a digital humanities Web site developed by MTSU's Walker Library, highlights the center's fieldwork and documentary projects across the region. ***Trials and Triumphs: Tennesseans Search for Citizenship, Community, and Opportunity*** is a mobile-friendly digital collection funded by the Tennessee Board of Regents and features materials that reflect the period between Reconstruction and the end of World War II. ***Landscape of Liberation: The African American Geography of Civil War Tennessee*** is an interactive map created by a partnership between MTSU's Geospatial Research Center and the Tennessee State Library & Archives, with digital research assistance from the Center for Historic Preservation and Walker Library.

Center for Popular Music

The Center for Popular Music (CPM) is an archive and research center devoted to the study of American folk and popular music. It was established in 1985 as one of sixteen Centers of Excellence at universities in the Tennessee Board of Regents system. The center's mission is to promote research and scholarship in popular music and to foster an appreciation of America's diverse musical culture and its global reach. To carry out this mission, the CPM maintains a large research library and archive, presents public programs that interpret various aspects of American vernacular music, engages in original research projects, and disseminates the results of research through publications in various media. The center also runs a Grammy-winning documentary record label, Spring Fed Records.

The CPM's archive is one of the largest and most important popular music research collections in the world. Materials in the center's collection fall into three broad categories. First are extensive holdings of the various types of media in which music has been fixed and sold as a commodity. These include print materials such as sheet music, song books, song broadsides and songsters, and sound recordings in formats ranging from cylinders to compact discs and digital files. The center's sound archive is one of the largest in the country and consists of more than 220,000 commercial sound recordings as well as many hours of unpublished recordings of music and interviews. The CPM's sheet music collection of approximately 110,000 items is the largest in the Southeast, and its library of gospel songbooks is one of the most extensive of any repository not associated with a religious organization. Second are various materials that are needed to study popular and vernacular music in all its musical, cultural, historical, technological, and commercial contexts, including such items as photographs, posters, playbills, concert programs, trade catalogs, music manuscripts, news clippings, and personal papers of musicians, songwriters, and business people. Third are books, periodicals, and other reference materials about popular music. The center has one of the largest and most comprehensive libraries of books and periodicals about popular music anywhere.

Materials in the center's collection do not circulate but are available to anyone doing research on popular music. Resources support undergraduate, graduate, and faculty research in a variety of disciplines and departments. In keeping with one of the aims of the Centers of Excellence program, the Center for Popular Music serves as a research resource for people far beyond the bounds of the University. Center staff members have fielded research queries from every state in the union and from more than thirty foreign countries. Authors, journalists, performers, media producers, documentary filmmakers, and students writing dissertations have all made use of the center's archive and library.

Public programs sponsored by the center include lectures, conferences, symposia, and concerts of contemporary and historical popular music.

Located on the first floor of the Bragg Media and Entertainment building, the center is open Monday through Friday from 8:30 am to 4:00 pm. The web address is www.mtsu.edu/popmusic.

Student Resources

Career Development Center

The Career Development Center (CDC) is a comprehensive center serving all departments and colleges of MTSU with career exploration, on-campus recruiting, and job searching. For more information, contact the Career Development Center, (615) 898-2500, or visit www.mtsu.edu/career/.

Child Care Lab

The MTSU Child Care Lab provides quality care for children ages 3-5 whose parents are attending or working at MTSU. For more information, contact the Child Care Lab, (615) 898-2970, or visit www.mtsu.edu/childcare/.

Counseling Services

Counseling Services offers crisis intervention, assessment, community referral, and limited personal counseling services, all designed to support students in their emotional, intellectual, and social growth. While we strive to be available to all students needing these services, we assume special responsibility for those in need of immediate assistance. Our goal is to understand students' concerns and to develop and implement counseling and referral plans that respond to their needs as effectively and expediently as possible. Counseling Services also coordinates the University's testing program, offering such standardized tests as the CLEP, ACT residual, the PRAXIS series, and others. For more information, contact Counseling Services, (615) 898-2670, or visit www.mtsu.edu/countest.

Disability and Access Center

The Disability and Access Center offers a wide variety of services to students with disabilities, including testing accommodations, providing access to the latest in adaptive computer technologies, and acting as a liaison to University departments. MTSU also provides an ADA/504 coordinator, Lance Alexis (interim), KUC 107, (615) 898-2783. For more information, contact Disability and Access Services, (615) 898-2783, or visit www.mtsu.edu/dac/.

Housing and Residential Life

Housing and Residential Life creates living-learning communities which promote personal and academic growth among a diverse student body. Additional information regarding on campus accommodations can be found at www.mtsu.edu/living-on-campus/.

Intercultural and Diversity Affairs

Intercultural and Diversity Affairs promotes cultural awareness, understanding, and a sense of belonging for all students at MTSU. For more information, contact Intercultural and Diversity Affairs, (615) 898-5812, or visit www.mtsu.edu/idac/.

June Anderson Center for Women and Nontraditional Students

The June Anderson Center for Women and Nontraditional Students provides student support services conducive to learning and personal development for both women students and for adult students who generally work fulltime, are married, have children, and other adult responsibilities beyond their college experiences. The center provides information and referrals about all aspects of academic and social life. For more information, contact June Anderson Center for Women and Nontraditional Students, (615) 898-5812, or visit www.mtsu.edu/jac/.

Student Health Services

Student Health Services ensures the delivery of affordable, accessible, and high quality health care integrated with the promotion of lifelong wellness for MTSU students. A prepaid student health fee covers the cost of basic office visits, and an on-site Pharmacy provides access to over-the-counter and prescription medication. For more

information about student health services, contact Student Health Services, (615) 898-2988, or visit www.mtsu.edu/healthservices/

Campus Life

Athletics

The MTSU Athletics program strives for excellence in the development of its student-athletes and the quality of its 17 sports teams. The program supports the academic, athletic, and social education of its student-athletes by encouraging them to develop the values of respect for themselves and others and to take pride in achievement and making positive contributions to the communities in which they live.

MTSU is committed to quality athletic programs that bring the campus community together and promote a sense of pride and tradition in academic and athletic excellence. Athletics also brings the University regional and national recognition and provides a link between the University and its alumni and the community at large. It helps generate alumni and public support for all aspects of the University. The athletics program provides quality faculty and leadership to campus programs. It gives students, faculty, and alumni opportunities for innovative public service activities such as the "Reading Raider" program, which has partnered with area elementary schools to promote student reading skills. It uses athletic, financial, and Housing and Residential Life physical resources to maintain and develop athletic programs to accomplish the mission of the University.

The University is a member of Conference USA and the National Collegiate Athletic Association, competing in NCAA Division I in all sports. MTSU is represented annually in baseball, basketball, cross-country, football, golf, tennis, indoor track, and outdoor track for men and by basketball, cross-country, golf, soccer, softball, tennis, indoor track, outdoor track, and volleyball for women.

Both full-time and part-time students are admitted to all home football, basketball, and baseball games by presenting their valid ID cards at the gate. Athletic events in other sports require no admission and are open to the public and campus community. The ticket office is located at Floyd Stadium Gate 1A. Ticket information can be obtained by phoning (615) 898-5261 or visiting GoBlueRaiders.com!

MTSU's Title IX coordinator is Dr. Marian Wilson, (615) 898-2185.

Information Technology

The MTSU Information Technology Division (ITD) supports information technology resources of the University. ITD manages the campus network and MTSU's primary academic and administrative computing systems; provides email and telecommunication services for the campus; promotes and supports instructional technology, including faculty consultation and training and maintenance support for all campus technology-based classrooms; administers the University's learning management system, D2L; provides technical support and training for the use of computer hardware and software; provides a seven-day-a-week (hours vary daily) information technology help desk when classes are in session; supports MTSU's primary administrative applications including PipelineMT, Banner, RaiderNet, and the data warehouse; and administers the STA (Student Technology Assistant) program, the campus ID system, and the MTSU website.

All MTSU students, staff, and faculty are provided with accounts that provide access to on-campus information technology resources as well as state, regional, national, and international networks. Students may activate their accounts at www.mtsu.edu/pipelinemt by clicking on the New User's link. The account will be ready to use within ten (10) minutes. Faculty and staff accounts are automatically created after job data has been entered into the Banner administrative system. Documentation is sent to the department of the faculty or staff member with login information. Faculty and staff can reset their passwords by going to www.mtsu.edu/password_change.php and choosing the appropriate link. For access to forms to create an organizational or retirement email account visit www.mtsu.edu/forms_emp_alpha.php and look for email.

Parking and Transportation Services

The Parking and Transportation Services Office issues parking permits and enforces parking regulations for the MTSU community.

All students (including part-time, full-time, graduate students, night students, etc.), administrators, faculty, and staff (whether full- or part-time) intending to park a vehicle on campus must obtain a permit through Parking and

Transportation Services and place the permit on or in the vehicle being operated on campus. Each individual is responsible for violations received by any vehicle bearing his/her parking permit.

Police Department

The MTSU Police Department maintains 24-hour coverage with police patrol and communications operators and assists with the safety and protection of the MTSU community. Services provided include law enforcement, communication of emergency services, building security, escorts, and general assistance to students.

College and University Security Information Act

Pursuant to the provisions of the "College and University Security Information Act," Public Chapter No. 317, enacted by the 1989 General Assembly, Middle Tennessee State University makes available crime rates and statistics as well as security policies and procedures to interested parties. Persons wishing to review or receive a copy of this information, may contact University Police at 1412 East Main Street, Murfreesboro, TN 37132 or by calling (615) 898-2424.

Information to help avoid becoming a victim of crimes such as theft and sexual assault is available in the MTSU Student Handbook and the Police Department Orientation calendar or online at www.mtsu.edu/police/.

Religious Opportunities

The Philosophy Department offers courses for academic credit in religious studies. In addition, every MTSU student is encouraged to attend worship services of his/her choice. The University seeks neither to promote nor to exclude any creed. Several campus ministries are located in facilities that border the campus.

College of Basic and Applied Sciences

Computational Science, Ph.D.

John Wallin, Program Director

(615) 494-7735

John.Wallin@mtsu.edu

www.mtsu.edu/COMS

The Ph.D. in Computational Science is an interdisciplinary program in the College of Basic and Applied Sciences and includes faculty from Agribusiness and Agriscience, Biology, Chemistry, Computer Science, Engineering Technology, Geosciences, Mathematical Sciences, and Physics and Astronomy. This program is research intensive and applied in nature, seeking to produce graduates with competency in the following three key areas:

1. mastery of the mathematical methods of computation as applied to scientific research investigations coupled with a firm understanding of the underlying fundamental science in at least one disciplinary specialization;
2. deep knowledge of programming languages, scientific programming, and computing technology so that graduates can adapt and grow as computing systems evolve; and
3. skills in effective written and oral communication so that graduates are prepared to assume leadership positions in academia, national labs, and industry.

Admission Requirements

Admission to the Doctor of Philosophy in Computational Science program is based on a comprehensive assessment of a candidate's qualifications including Graduate Record Examination (GRE) scores, undergraduate and graduate grade point average, and letters of recommendation.

Applicants who do not meet these minimums but whose application materials indicate high potential for success may be admitted conditionally. Such students must meet the conditions of their admission in the time stated to remain in the program of study.

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

The application deadline is February 15 for those wishing to be considered for graduate assistantships for the following Fall. Late applications may be considered, but admission and financial support in the form of an assistantship are not guaranteed.

Applicant must

1. submit an application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php).
2. submit official scores for the verbal, quantitative, and analytical writing measures of the GRE that indicate potential for success in the Computational Science program. The GRE is an important measure and is given significant consideration in the admissions review process. Successful applicants typically have Verbal and Quantitative scores at or above the 50th percentile for persons intending graduate study in science with a combined V + Q score exceeding 297 (current scale) or 1,000 (former scale);
3. submit official transcripts showing a GPA in previous academic work that indicates potential for success in advanced study. Successful applicants typically have a minimum 3.50 GPA in their graduate work or a minimum 3.00 GPA when entering with a bachelor's degree. Applicants should hold a bachelor's, master's, or doctoral degree in a science discipline;
4. provide letters of recommendation from at least three professors or professionals that address the applicant's potential to successfully complete a Ph.D. in the Computational Science program.

It is also strongly recommended that prospective students submit a one-page statement of their background and research interests as part of the application. The statement should include a short summary of experience in mathematics, computer programming, and in science along with the types of problems they hope to work on when they join the program.

Degree Requirements

The Ph.D. in Computational Science requires completion of 72 semester hours.

In addition to completing the coursework and dissertation, the candidate must

1. make at least two research presentations at regional, national, or international meetings as the lead or coauthor;
2. be lead author or make significant contribution as coauthor of two articles published, in press, or under review in high quality, peer-reviewed journals;
3. make a significant contribution to the development of at least one external grant proposal in collaboration with an MTSU faculty member serving as principal investigator.

Curriculum: Computational Science

Candidate must complete 72 hours in the following course of study:

Foundation Courses (11 hours)

- COMS 6100 - Fundamentals of Computational Science **3 credit hours**
- COMS 6500 - Fundamentals of Scientific Computing **4 credit hours**
- CSCI 6050 - Computer Systems Fundamentals **4 credit hours**

Computational Science Core (19-21 hours)

- CSCI 6330 - Parallel Processing Concepts **3 credit hours**
- COMS 7800 - Teaching Internship **3 credit hours**
- COMS 7950 - Research Seminar in Computational Science **1 credit hours (1 credit hour per semester over three semesters)**
- COMS 7900 - Computational Science Capstone **4 credit hours**
- COMS 7100 - Applied Computational Science **4 credit hours** AND
- COMS 7300 - Numerical Partial Differential Equations **4 credit hours**
OR
- CSCI 7350 - Data Mining **3 credit hours** AND
- STAT 7400 - Computational Statistics **3 credit hours**

Electives (16-18 hours)

Electives can come from departmental master's degree programs and the COMS program.

- COMS 7840 - Selected Topics in the Natural and Applied Sciences **3 credit hours**
- COMS 7700 - Advanced Concepts in Computational Science **3 or 4 credit hours (3 credit hours)**
- Other electives **10 to 12 credit hours**

Directed Research (12 hours)

Students must complete 12 hours of directed research before advancement to candidacy. Student may not take more than 6 credit hours of directed research per semester.

- COMS 7500 - Directed Research in Computational Science **1 to 6 credit hours (12 credit hours)**

Dissertation (12 hours)

- COMS 7640 - Dissertation Research **1 to 6 credit hours (12 credit hours)**

Program Notes

Applicants holding a master's degree will be expected to have earned at least 21 semester hours of graduate mathematics, science, or engineering credit with evidence of strong mathematical skills and experience in computation through coursework, employment, and/or research experiences. Applicants applying from the baccalaureate level must have an appropriate science degree with evidence of strong mathematical skills and experience in computation through coursework, employment, and/or research experiences.

Students entering with a master's degree in a mathematical, science, or engineering discipline may, on the recommendation of the program coordination committee and with the approval of the graduate dean, have up to 12 credit hours accepted from their master's if it directly corresponds to coursework in the Computational Science curriculum. Students who are interested in pursuing a Master's Degree in Mathematics or Computer Science while pursuing their Ph.D. will need to consult with the program director and the respective departments to understand the additional requirements.

Applicants lacking necessary foundational coursework in previous degrees will be required to complete some remedial courses as part of their program of study in addition to the degree requirements.

Candidate must

1. file a degree plan in the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which candidate intends to graduate.

Computational Science

COMS 6100 - Fundamentals of Computational Science

3 credit hours

Prerequisite: Admission to the Computational Science Ph.D. program or permission of instructor.

Foundational overview of the mathematical and scientific underpinnings of computational science. Introduces the principles of finding computer solutions to contemporary science challenges. Offers preparation for core and elective courses in the Ph.D. program in Computational Science by reviewing essential mathematical methods and basic science principles drawn from biology, chemistry, and physics. Special topics include techniques of high performance computing and applications, parallel systems, and theory of computation, case studies in computational chemistry, physics, and mathematical biology.

COMS 6500 - Fundamentals of Scientific Computing

4 credit hours

Prerequisite: Graduate standing or permission of instructor. Fundamentals of problem solving approaches in computational science, including computer arithmetic and error analysis, linear and nonlinear equations, least squares, interpolation, numerical differentiation and integration, optimization, random number generations and Monte Carlo simulation. Students will gain computational experience by analyzing case studies using modern software packages such as MATLAB.

COMS 7100 - Applied Computational Science

4 credit hours

Prerequisite: Consent of instructor. Intense lecture and practice-based course in computational methods, with a research program offered. Possible topics include computational aspects of linear algebra; contemporary numerical methods (finite difference-based and boundary integral equation-based) for solving initial and boundary value problems for ordinary and partial differential equations arising in engineering, natural sciences, and economics and finance.

COMS 7300 - Numerical Partial Differential Equations

4 credit hours

Prerequisite: COMS 6500 or permission of instructor. Numerical methods for solving ordinary and partial differential equations, partial differential integral

equations, and stochastic differential equations. Convergence and stability analyses, finite difference methods, finite element methods, mesh-free methods and fast Fourier transform also included.

COMS 7500 - Directed Research in Computational Science

1 to 6 credit hours

For Ph.D. students prior to advancement to candidacy. Selection of a research problem, review of pertinent literature, protocol design, collection and analysis of data, and preparation of results for publication. S/U grading.

COMS 7640 - Dissertation Research

1 to 6 credit hours

Prerequisite: Advancement to candidacy within the Computational Science Ph.D. program. Involves the student working with their research advisor on any of the aspects of the Ph.D. dissertation from the selection of research problem, a review of the pertinent literature, formulation of a computational approach, data analysis, and composition of the dissertation.

COMS 7654 - Professional Seminar: Topic

1 to 3 credit hours

(Same as MSE/MOBI 7654.) Focuses on a specific topic in a given semester. Topics include themes for advancing graduate students professional knowledge such as grant proposal preparation process, making successful presentations, and publishing research in the field. May be repeated with different topic.

COMS 7700 - Advanced Concepts in Computational Science

3 or 4 credit hours

Advanced topics and protocols specific to different subdivisions of computational science not covered in core or elective courses offered through the program. Students will work under the direct supervision of the instructor. Lecture and/or laboratory components. May be repeated for 6 to 8 credit hours.

COMS 7800 - Teaching Internship

3 credit hours

Designed for graduate students in Computational Science in order to develop better classroom skills and to build an understanding that good teaching practices can be learned and continuously improved. S/U grading.

COMS 7840 - Selected Topics in the Natural and Applied Sciences

3 credit hours

Selected topics in the natural and applied sciences for Computational Science students. Provides an opportunity to study applications of computational techniques to real world problems and enhance the domain knowledge of students within the program. Rotating topics may include computational chemistry, computational physics, and computational biology.

COMS 7900 - Computational Science Capstone

4 credit hours

Prerequisites: COMS 6500 and CSCI 6330 or permission of instructor. Requires students to apply advanced computing and mathematics to solve problems in natural and applied sciences. Students

expected to apply parallel computing, advanced simulation and data mining techniques to solve a research problem in collaboration with advisor. Course co-taught by two faculty members from different departments. Final presentations open to students, faculty, and visitors.

COMS 7950 - Research Seminar in Computational Science

1 credit hours

Prerequisite: Admission to the Computational Science Ph.D. program or permission of instructor. Seminar course to build a broader understanding of problems and research topics in computational science through advanced reading of selected journal articles, group discussion, and presentations by both external and internal speakers in computational science.

Mathematics and Science Education, Biological Education Concentration, Ph.D.

Sarah Bleiler-Baxter, Interim Program Director
(615) 898-5353

Sarah.Bleiler@mtsu.edu

The Doctor of Philosophy (Ph.D.) in Mathematics and Science Education is an interdisciplinary program requiring students to (1) develop substantial content mastery of mathematics and/or science; (2) demonstrate an understanding of educational theories, research methodologies, and best practices; and (3) conduct discipline-based educational research at the interface between the fields of mathematics or science and education. This program aims to produce college-level professors and researchers to perform, evaluate, and integrate the results of research in mathematics and science education. It also seeks approaches to improve the way K-16 science, technology, engineering, and mathematics (STEM) courses are taught.

The goals of this program are to prepare students to

- understand the field of mathematics and science education in terms of theory and practice, research, curriculum design, and student learning;
- conduct original research that generates new knowledge about the teaching and learning of mathematics and science; and
- assume leadership roles in mathematics and science education, including teacher education, discipline-based educational research, and curriculum and instruction.

All students in the Mathematics and Science Education Ph.D. program will be expected to complete the residency requirement during the first year of enrollment in the program. Please see **Residency Requirement** (below) for more information.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admission to the Ph.D. in Mathematics and Science Education with a concentration in Biological Education is based on a comprehensive assessment of a candidate's qualifications including Graduate Record Examination (GRE) scores, undergraduate and graduate grade point average, and letters of recommendation.

Admission requires

1. an earned bachelor's or master's degree from an accredited university or college. Applicants holding only a bachelor's degree will be expected to have earned that degree in an area of mathematics or science and will be expected to earn a master's degree in science, mathematics, or education as they complete the requirements of the Ph.D. All applicants to this program will either possess a mathematics or science degree upon admission or will be required to earn a content master's as a part of their program of study.
2. an acceptable grade point average (GPA). Successful applicants typically have a minimum 3.25 GPA in their most recent graduate work or a minimum 3.00 GPA when entering with a bachelor's degree. Applicants holding a master's degree should have earned at least 24 semester hours of graduate mathematics, science, and/or education credit.

Application Procedures

Applicants must submit all application materials to the College of Graduate Studies.

Application deadline: February 15 for those wishing to be considered for graduate assistantships for the following Fall. Late applications may be considered, but financial support in the form of an assistantship is not guaranteed.

Applicant must

1. submit application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit official transcripts showing a grade point average (GPA) in previous academic work that indicates potential for success in advanced study;

- submit official scores for the verbal, quantitative, and analytical writing measures of the GRE that indicate potential for success in the Mathematics and Science Education program. Although specific minimum scores are not set, evaluation of scores is an important factor in admission decisions.
- provide letters of recommendation from at least three professors or professionals that address the applicant's potential to successfully complete a Ph.D. in Mathematics and Science Education.

NOTE: International students must also meet the College of Graduate Studies requirement for proof of English language proficiency. This may be accomplished by submission of TOEFL, UMELI test, or IELTS scores that meet the college's requirements or by successful completion of level 112 of ELS coursework.

Applicants who do not meet these minimums but whose application materials indicate high potential for success may be admitted conditionally. Such students must meet the conditions of their admission in the time stated to remain in the program of study.

Degree Requirements

Once admitted to the program, each candidate must

- complete at least 75 post-baccalaureate semester hours as described in the Curriculum section below. (Students entering with a master's degree in mathematics, education, or a science discipline may have up to 15 graduate hours of previous coursework applied after determination that the content of the courses is directly equivalent to existing courses in the Mathematics and Science Education curriculum.)
- make at least two research presentations at regional, national, or international meetings as the lead or coauthor;
- be lead author or make significant contribution as coauthor of two articles published, in press, or under review in high quality, peer-reviewed journals;
- in collaboration with an MTSU faculty member serving as principal investigator, make a significant contribution to the development of at least one external grant proposal;
- complete the MSE 7800 - Teaching Internship. Those who lack teaching experience in the K-12 setting are required to complete MSE 7800 in a K-12 teaching experience;
- complete a dissertation and successfully defend it in the final oral examination.

Residency Requirement

During the residency year, students are expected to complete at least 18 hours of coursework that apply directly to the degree. Of these 18 hours, 14 hours of coursework are required.

Fall Semester (5 hours)

- MSE 7001 Residency Seminar I **1 credit hour**
- MSE 7820 Seminar in Mathematics and Science Education **1 credit hours**
- PSY 7190 Advanced Cognitive Psychology **3 credit hours**

Spring Semester (6 hours)

- MSE 7002 Residency Seminar II **1 credit hour**
- SPSE 7010 Educational Research Methodology **3 credit hours**
- MSE 7845 Nature of Mathematics and Science **2 credit hours OR**
- MSE 7848 Knowledge for Teaching in Mathematics and Science **2 credit hours**

Summer (3 hours)

- SPSE 7220 Advanced Educational Technology **3 credit hours OR**
- SPSE 7170 Learning Theories and the Educational Process **3 credit hours**

In addition, during the residency year, students are expected to complete each of the following:

- Attend at least one conference:** The conference should be directly related to the student's concentration (i.e., biology education, chemistry education, science education, mathematics education) and should be at the regional, national, or international level. The advisor must approve the selected conference.
- Submit a manuscript:** The manuscript will be prepared under the guidance of or in conjunction with MSE faculty. Residency seminars will support this process.

3. **Attend at least five (5) program activities not associated with course credit:** The MSE program has numerous activities that occur during the academic year (i.e., fall and spring semesters). These include seminars, book club meetings, reading/writing groups, journal clubs, etc. Some of these are intended for all MSE students while others are specific to concentrations.

Curriculum: Mathematics and Science Education, Biological Education

All Ph.D. candidates must complete 75 hours in the following course of study:

Core Courses (33 hours)

- MSE 7800 - Teaching Internship **3 credit hours**
 - MSE 7820 - Seminar in Mathematics and Science Education **1 credit hours** *
 - MSE 7845 - Nature of Mathematics and Science **2 credit hours**
 - MSE 7848 - Knowledge for Teaching in Mathematics and Science **2 credit hours**
 - MSE 7900 - Teaching and Learning Mathematics and Science **3 credit hours**
 - PSY 7190 - Advanced Cognitive Psychology **3 credit hours**
 - PSY 7280 - Psychological Statistics: Regression **3 credit hours** AND
 - PSY 7281 - Psychological Statistics: Regression Lab **0 credit hours**
 - PSY 7290 - Psychological Statistics: ANOVA **3 credit hours** AND
 - PSY 7291 - Psychological Statistics: ANOVA Lab **0 credit hours**
 - SPSE 7010 - Educational Research Methodology **3 credit hours**
 - SPSE 7170 - Learning Theories and the Educational Process **3 credit hours**
 - SPSE 7180 - Qualitative Evaluation and Research Methods **3 credit hours**
 - SPSE 7220 - Advanced Educational Technology **3 credit hours**
- *Students are required to take this course at least twice before candidacy.*

Concentration Core (18 hours)

- BIOL 6200 - Speciation **3 credit hours**
- BIOL 6460 - Conservation Biology **4 credit hours**
- BIOL 7900 - Teaching and Learning Biology **3 credit hours**
- Biology **4 credit hours**
- BIOL 6450 - Advancements in Molecular Genetics **4 credit hours** OR
- BIOL 6760 - Bioinformatics **4 credit hours**

Electives (11-12 hours)

In consultation with his or her major advisor and dissertation committee, each student will choose 11-12 credit hours from courses in the College of Basic and Applied Sciences and the College of Education at the 6000 or 7000 level. Students in the Biological Education concentration should select their electives to ensure that they have completed at least 21 hours of coursework with a BIOL rubric.

Dissertation (12 hours)

- MSE 7640 - Dissertation Research in Mathematics and Science Education **1 to 6 credit hours**

Program Notes

Candidate must

1. file a degree plan with the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which candidate intends to graduate.

Mathematics and Science Education, Chemical Education Concentration, Ph.D.

Sarah Bleiler-Baxter, Interim Program Director

(615) 898-5353

Sarah.Bleiler@mtsu.edu

The Doctor of Philosophy (Ph.D.) in Mathematics and Science Education is an interdisciplinary program requiring students to (1) develop substantial content mastery of mathematics and/or science; (2) demonstrate an understanding of educational theories, research methodologies, and best practices; and (3) conduct discipline-based educational research at the interface between the fields of mathematics or science and education. This program aims to produce college-level professors and researchers to perform, evaluate, and integrate the results of research in mathematics and science education. It also seeks approaches to improve the way K-16 science, technology, engineering, and mathematics (STEM) courses are taught.

The goals of this program are to prepare students to

- understand the field of mathematics and science education in terms of theory and practice, research, curriculum design, and student learning;
- conduct original research that generates new knowledge about the teaching and learning of mathematics and science; and
- assume leadership roles in mathematics and science education, including teacher education, discipline-based educational research, and curriculum and instruction.

All students in the Mathematics and Science Education Ph.D. program will be expected to complete the residency requirement during the first year of enrollment in the program. Please see **Residency Requirement** (below) for more information.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admission to the Ph.D. in Mathematics and Science Education with a concentration in Chemical Education is based on a comprehensive assessment of a candidate's qualifications including Graduate Record Examination (GRE) scores, undergraduate and graduate grade point average, and letters of recommendation.

Admission requires

1. an earned bachelor's or master's degree from an accredited university or college. Applicants holding only a bachelor's degree will be expected to have earned that degree in an area of mathematics or science and will be expected to earn a master's degree in science, mathematics, or education as they complete the requirements of the Ph.D. All applicants to this program will either possess a mathematics or science degree upon admission or will be required to earn a content master's as a part of their program of study.
2. an acceptable grade point average (GPA). Successful applicants typically have a minimum 3.25 GPA in their most recent graduate work or a minimum 3.00 GPA when entering with a bachelor's degree. Applicants holding a master's degree should have earned at least 24 semester hours of graduate mathematics, science, and/or education credit.

Application Procedures

Applicants must submit all application materials to the College of Graduate Studies.

Application deadline: February 15 for those wishing to be considered for graduate assistantships for the following Fall. Late applications may be considered, but financial support in the form of an assistantship is not guaranteed.

Applicant must

1. submit application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit official transcripts showing a grade point average (GPA) in previous academic work that indicates potential for success in advanced study;

- submit official scores for the verbal, quantitative, and analytical writing measures of the GRE that indicate potential for success in the Mathematics and Science Education program. Although specific minimum scores are not set, evaluation of scores is an important factor in admission decisions.
- provide letters of recommendation from at least three professors or professionals that address the applicant's potential to successfully complete a Ph.D. in Mathematics and Science Education.

NOTE: International students must also meet the College of Graduate Studies requirement for proof of English language proficiency. This may be accomplished by submission of TOEFL, UMELI test, or IELTS scores that meet the college's requirements or by successful completion of level 112 of ELS coursework.

Applicants who do not meet these minimums but whose application materials indicate high potential for success may be admitted conditionally. Such students must meet the conditions of their admission in the time stated to remain in the program of study.

Degree Requirements

Once admitted to the program, each candidate must

- complete at least 75 post-baccalaureate semester hours as described in the Curriculum section below. (Students entering with a master's degree in mathematics, education, or a science discipline may have up to 15 graduate hours of previous coursework applied after determination that the content of the courses is directly equivalent to existing courses in the Mathematics and Science Education curriculum.)
- make at least two research presentations at regional, national, or international meetings as the lead or coauthor.
- be lead author or make significant contribution as coauthor of two articles published, in press, or under review in high quality, peer-reviewed journals.
- in collaboration with an MTSU faculty member serving as principal investigator, make a significant contribution to the development of at least one external grant proposal.
- complete the MSE 7800 - Teaching Internship. Those who lack teaching experience in the K-12 setting are required to complete MSE 7800 in a K-12 teaching experience.
- complete a dissertation and successfully defend it in the final oral examination.

Residency Requirement

During the residency year, students are expected to complete at least 18 hours of coursework that apply directly to the degree. Of these 18 hours, 14 hours of coursework are required.

Fall Semester (5 hours)

- MSE 7001 Residency Seminar I **1 credit hour**
- MSE 7820 Seminar in Mathematics and Science Education **1 credit hours**
- PSY 7190 Advanced Cognitive Psychology **3 credit hours**

Spring Semester (6 hours)

- MSE 7002 Residency Seminar II **1 credit hour**
- SPSE 7010 Educational Research Methodology **3 credit hours**
- MSE 7845 Nature of Mathematics and Science **2 credit hours OR**
- MSE 7848 Knowledge for Teaching in Mathematics and Science **2 credit hours**

Summer (3 hours)

- SPSE 7220 Advanced Educational Technology **3 credit hours OR**
- SPSE 7170 Learning Theories and the Educational Process **3 credit hours**

In addition, during the residency year, students are expected to complete each of the following:

- Attend at least one conference:** The conference should be directly related to the student's concentration (i.e., biology education, chemistry education, science education, mathematics education) and should be at the regional, national, or international level. The advisor must approve the selected conference.
- Submit a manuscript:** The manuscript will be prepared under the guidance of or in conjunction with MSE faculty. Residency seminars will support this process.

3. **Attend at least five (5) program activities not associated with course credit:** The MSE program has numerous activities that occur during the academic year (i.e., fall and spring semesters). These include seminars, book club meetings, reading/writing groups, journal clubs, etc. Some of these are intended for all MSE students while others are specific to concentrations.

Curriculum: Mathematics and Science Education, Chemical Education

All Ph.D. candidates must complete 75 hours in the following course of study:

Required Core Courses (33 hours)

- MSE 7800 - Teaching Internship **3 credit hours**
 - MSE 7820 - Seminar in Mathematics and Science Education **1 credit hours** *
 - MSE 7845 - Nature of Mathematics and Science **2 credit hours**
 - MSE 7848 - Knowledge for Teaching in Mathematics and Science **2 credit hours**
 - MSE 7900 - Teaching and Learning Mathematics and Science **3 credit hours**
 - PSY 7190 - Advanced Cognitive Psychology **3 credit hours**
 - PSY 7280 - Psychological Statistics: Regression **3 credit hours** AND
 - PSY 7281 - Psychological Statistics: Regression Lab **0 credit hours**
 - PSY 7290 - Psychological Statistics: ANOVA **3 credit hours** AND
 - PSY 7291 - Psychological Statistics: ANOVA Lab **0 credit hours**
 - SPSE 7010 - Educational Research Methodology **3 credit hours**
 - SPSE 7170 - Learning Theories and the Educational Process **3 credit hours**
 - SPSE 7180 - Qualitative Evaluation and Research Methods **3 credit hours**
 - SPSE 7220 - Advanced Educational Technology **3 credit hours**
- * **Students are required to take this course at least twice before candidacy.**

Concentration Core (19 hours)

- CHEM 6100 - Intermediate Organic Chemistry **3 credit hours**
- CHEM 6230 - Intermediate Analytical Chemistry **4 credit hours**
- CHEM 6300 - Intermediate Physical Chemistry **3 credit hours**
- CHEM 6400 - Intermediate Inorganic Chemistry **3 credit hours**
- CHEM 6500 - Biochemistry I **3 credit hours**
- CHEM 7900 - Teaching and Learning in Chemistry **3 credit hours**

Electives (11-12 hours)

In consultation with his or her major advisor and dissertation committee, each student will choose 11-12 credit hours from courses in the College of Basic and Applied Sciences and the College of Education at the 6000 or 7000 level. Students in the Chemical Education concentration should select their electives to ensure that they have completed at least 21 hours with a CHEM rubric.

Dissertation (12 hours)

- MSE 7640 - Dissertation Research in Mathematics and Science Education **1 to 6 credit hours**

Program Notes

Candidate must

1. file a degree plan with the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which they intend to graduate.

Mathematics and Science Education, Interdisciplinary Science Education Concentration, Ph.D.

Sarah Bleiler-Baxter, Interim Program Director

(615) 898-5353

Sarah.Bleiler@mtsu.edu

The Doctor of Philosophy (Ph.D.) in Mathematics and Science Education is an interdisciplinary program requiring students to (1) develop substantial content mastery of mathematics and/or science; (2) demonstrate an understanding of educational theories, research methodologies, and best practices; and (3) conduct discipline-based educational research at the interface between the fields of mathematics or science and education. This program aims to produce college-level professors and researchers to perform, evaluate, and integrate the results of research in mathematics and science education. It also seeks approaches to improve the way K-16 science, technology, engineering, and mathematics (STEM) courses are taught.

The goals of this program are to prepare students to

- understand the field of mathematics and science education in terms of theory and practice, research, curriculum design, and student learning;
- conduct original research that generates new knowledge about the teaching and learning of mathematics and science; and
- assume leadership roles in mathematics and science education, including teacher education, discipline-based educational research, and curriculum and instruction.

All students in the Mathematics and Science Education Ph.D. program will be expected to complete the residency requirement during the first year of enrollment in the program. Please see **Residency Requirement** (below) for more information.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admission to the Ph.D. in Mathematics and Science Education with a concentration in Interdisciplinary Science Education is based on a comprehensive assessment of a candidate's qualifications including Graduate Record Examination (GRE) scores, undergraduate and graduate grade point average, and letters of recommendation.

Admission requires

1. an earned bachelor's or master's degree from an accredited university or college. Applicants holding only a bachelor's degree will be expected to have earned that degree in an area of mathematics or science and will be expected to earn a master's degree in science, mathematics, or education as they complete the requirements of the Ph.D. All applicants to this program will either possess a mathematics or science degree upon admission or will be required to earn a content master's as a part of their program of study.
2. an acceptable grade point average (GPA). Successful applicants typically have a minimum 3.25 GPA in their most recent graduate work or a minimum 3.00 GPA when entering with a bachelor's degree. Applicants holding a master's degree should have earned at least 24 semester hours of graduate mathematics, science, and/or education credit.

Application Procedures

Applicants must submit all application materials to the College of Graduate Studies.

Application deadline: February 15 for those wishing to be considered for graduate assistantships for the following Fall. Late applications may be considered, but financial support in the form of an assistantship is not guaranteed.

Applicant must

1. submit application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit official transcripts showing a grade point average (GPA) in previous academic work that indicates potential for success in advanced study;

- submit official scores for the verbal, quantitative, and analytical writing measures of the GRE that indicate potential for success in the Mathematics and Science Education program. Although specific minimum scores are not set, evaluation of scores is an important factor in admission decisions.
- provide letters of recommendation from at least three professors or professionals that address the applicant's potential to successfully complete a Ph.D. in Mathematics and Science Education.

NOTE: International students must also meet the College of Graduate Studies requirement for proof of English language proficiency. This may be accomplished by submission of TOEFL, UMELI test, or IELTS scores that meet the college's requirements or by successful completion of level 112 of ELS coursework.

Applicants who do not meet these minimums but whose application materials indicate high potential for success may be admitted conditionally. Such students must meet the conditions of their admission in the time stated to remain in the program of study.

Degree Requirements

Once admitted to the program, each candidate must

- complete at least 75 post-baccalaureate semester hours as described in the Curriculum section below. (Students entering with a master's degree in mathematics, education, or a science discipline may have up to 15 graduate hours of previous coursework applied after determination that the content of the courses is directly equivalent to existing courses in the Mathematics and Science Education curriculum.)
- make at least two research presentations at regional, national, or international meetings as the lead or coauthor;
- be lead author or make significant contribution as coauthor of two articles published, in press, or under review in high quality, peer-reviewed journals;
- in collaboration with an MTSU faculty member serving as principal investigator, make a significant contribution to the development of at least one external grant proposal;
- complete the MSE 7800 - Teaching Internship. Those who lack teaching experience in the K-12 setting are required to complete MSE 7800 in a K-12 teaching experience;
- complete a dissertation and successfully defend it in the final oral examination.

Residency Requirement

During the residency year, students are expected to complete at least 18 hours of coursework that apply directly to the degree. Of these 18 hours, 14 hours of coursework are required.

Fall Semester (5 hours)

- MSE 7001 Residency Seminar I **1 credit hour**
- MSE 7820 Seminar in Mathematics and Science Education **1 credit hours**
- PSY 7190 Advanced Cognitive Psychology **3 credit hours**

Spring Semester (6 hours)

- MSE 7002 Residency Seminar II **1 credit hour**
- SPSE 7010 Educational Research Methodology **3 credit hours**
- MSE 7845 Nature of Mathematics and Science **2 credit hours OR**
- MSE 7848 Knowledge for Teaching in Mathematics and Science **2 credit hours**

Summer (3 hours)

- SPSE 7220 Advanced Educational Technology **3 credit hours OR**
- SPSE 7170 Learning Theories and the Educational Process **3 credit hours**

In addition, during the residency year, students are expected to complete each of the following:

- Attend at least one conference:** The conference should be directly related to the student's concentration (i.e., biology education, chemistry education, science education, mathematics education) and should be at the regional, national, or international level. The advisor must approve the selected conference.
- Submit a manuscript:** The manuscript will be prepared under the guidance of or in conjunction with MSE faculty. Residency seminars will support this process.

3. **Attend at least five (5) program activities not associated with course credit:** The MSE program has numerous activities that occur during the academic year (i.e., fall and spring semesters). These include seminars, book club meetings, reading/writing groups, journal clubs, etc. Some of these are intended for all MSE students while others are specific to concentrations.

Curriculum: Mathematics and Science Education, Interdisciplinary Science Education

All Ph.D. candidates must complete 75 hours in the following course of study:

Core Courses (33 hours)

- MSE 7800 - Teaching Internship **3 credit hours**
 - MSE 7820 - Seminar in Mathematics and Science Education **1 credit hours** *
 - MSE 7845 - Nature of Mathematics and Science **2 credit hours**
 - MSE 7848 - Knowledge for Teaching in Mathematics and Science **2 credit hours**
 - MSE 7900 - Teaching and Learning Mathematics and Science **3 credit hours**
 - PSY 7190 - Advanced Cognitive Psychology **3 credit hours**
 - PSY 7280 - Psychological Statistics: Regression **3 credit hours** AND
 - PSY 7281 - Psychological Statistics: Regression Lab **0 credit hours**
 - PSY 7290 - Psychological Statistics: ANOVA **3 credit hours** AND
 - PSY 7291 - Psychological Statistics: ANOVA Lab **0 credit hours**
 - SPSE 7010 - Educational Research Methodology **3 credit hours**
 - SPSE 7170 - Learning Theories and the Educational Process **3 credit hours**
 - SPSE 7180 - Qualitative Evaluation and Research Methods **3 credit hours**
 - SPSE 7220 - Advanced Educational Technology **3 credit hours**
- *Students are required to take this course at least twice before candidacy.*

Concentration Core (18 hours)

Students who choose this concentration must select at least 18 hours (in consultation with their major advisors and dissertation committee) from the courses listed in the Biological Education, Chemical Education, and Mathematics Education concentrations in Mathematics and Science Education or from the courses listed below:

- BIOL 7850 - Intermediate Life Science **3 credit hours**
- MATH 6100 - Mathematics for Teachers **3 credit hours**
- MATH 6330 - Algebra from an Advanced Perspective **3 credit hours**
- MATH 6340 - Geometry from an Advanced Perspective **3 credit hours**
- MATH 6350 - Probability and Statistics from an Advanced Perspective **3 credit hours**
- MSE 7900 - Teaching and Learning Mathematics and Science **3 credit hours**
- PSCI 6020 - Investigations in Physical Science **1 to 3 credit hours**
- PSY 6480 - Advanced Topics in Quantitative Psychology **3 credit hours**
- PSY 6550 - Structural Equation Modeling **3 credit hours**
- PSY 7210 - Advanced Psychometrics **3 credit hours**
- PSY 7580 - Multivariate Data Analysis **3 credit hours**
- PSCI 7800 - Intermediate Physical Science **3 credit hours**

Students must take one of the following courses:

- BIOL 7900 - Teaching and Learning Biology **3 credit hours**
- CHEM 7900 - Teaching and Learning in Chemistry **3 credit hours**
- MATH 7900 - Teaching and Learning Mathematics **3 credit hours**

Electives (11-12 hours)

In consultation with his or her major advisor and dissertation committee, each student will choose 11-12 credit hours from courses in the College of Basic and Applied Sciences and the College of Education at the 6000 or 7000 level.

Dissertation (12 hours)

- MSE 7640 - Dissertation Research in Mathematics and Science Education **1 to 6 credit hours**

Program Notes

Candidate must

1. file a degree plan in the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which candidate intends to graduate.

Mathematics and Science Education, Mathematics Education Concentration, Ph.D.

Sarah Bleiler-Baxter, Interim Program Director

(615) 898-5353

Sarah.Bleiler@mtsu.edu

The Doctor of Philosophy (Ph.D.) in Mathematics and Science Education is an interdisciplinary program requiring students to (1) develop substantial content mastery of mathematics and/or science; (2) demonstrate an understanding of educational theories, research methodologies, and best practices; and (3) conduct discipline-based educational research at the interface between the fields of mathematics or science and education. This program aims to produce college-level professors and researchers to perform, evaluate, and integrate the results of research in mathematics and science education. It also seeks approaches to improve the way K-16 science, technology, engineering, and mathematics (STEM) courses are taught.

The goals of this program are to prepare students to

- understand the field of mathematics and science education in terms of theory and practice, research, curriculum design, and student learning;
- conduct original research that generates new knowledge about the teaching and learning of mathematics and science; and
- assume leadership roles in mathematics and science education, including teacher education, discipline-based educational research, and curriculum and instruction.

All students in the Mathematics and Science Education Ph.D. program will be expected to complete the residency requirement during the first year of enrollment in the program. Please see **Residency Requirement** (below) for more information.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admission to the Ph.D. in Mathematics and Science Education with a concentration in Mathematics Education is based on a comprehensive assessment of a candidate's qualifications including Graduate Record Examination (GRE) scores, undergraduate and graduate grade point average, and letters of recommendation.

Admission requires

1. an earned bachelor's or master's degree from an accredited university or college. Applicants holding only a bachelor's degree will be expected to have earned that degree in an area of mathematics or science and will be expected to earn a master's degree in science, mathematics, or education as they complete the requirements of the Ph.D. All applicants to this program will either possess a mathematics or science degree upon admission or will be required to earn a content master's as a part of their program of study.
2. an acceptable grade point average (GPA). Successful applicants typically have a minimum 3.25 GPA in their most recent graduate work or a minimum 3.00 GPA when entering with a bachelor's degree. Applicants holding a master's degree should have earned at least 24 semester hours of graduate mathematics, science, and/or education credit.

Application Procedures

Applicants must submit all application materials to the College of Graduate Studies.

Application deadline: February 15 for those wishing to be considered for graduate assistantships for the following Fall. Late applications may be considered, but financial support in the form of an assistantship is not guaranteed.

Applicant must

1. submit application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit official transcripts showing a grade point average (GPA) in previous academic work that indicates potential for success in advanced study;

- submit official scores for the verbal, quantitative, and analytical writing measures of the GRE that indicate potential for success in the Mathematics and Science Education program. Although specific minimum scores are not set, evaluation of scores is an important factor in admission decisions.
- provide letters of recommendation from at least three professors or professionals that address the applicant's potential to successfully complete a Ph.D. in Mathematics and Science Education.

NOTE: International students must also meet the College of Graduate Studies requirement for proof of English language proficiency. This may be accomplished by submission of TOEFL, UMELI test, or IELTS scores that meet the college's requirements or by successful completion of level 112 of ELS coursework.

Applicants who do not meet these minimums but whose application materials indicate high potential for success may be admitted conditionally. Such students must meet the conditions of their admission in the time stated to remain in the program of study.

Degree Requirements

Once admitted to the program, each candidate must

- complete at least 75 post-baccalaureate semester hours as described in the Curriculum section below. (Students entering with a master's degree in mathematics, education, or a science discipline may have up to 15 graduate hours of previous coursework applied after determination that the content of the courses is directly equivalent to existing courses in the Mathematics and Science Education curriculum.)
- make at least two research presentations at regional, national, or international meetings as the lead or coauthor;
- be lead author or make significant contribution as coauthor of two articles published, in press, or under review in high quality, peer-reviewed journals;
- in collaboration with an MTSU faculty member serving as principal investigator, make a significant contribution to the development of at least one external grant proposal;
- complete the MSE 7800 - Teaching Internship. Those who lack teaching experience in the K-12 setting are required to complete MSE 7800 in a K-12 teaching experience;
- complete a dissertation and successfully defend it in the final oral examination.

Residency Requirement

During the residency year, students are expected to complete at least 18 hours of coursework that apply directly to the degree. Of these 18 hours, 14 hours of coursework are required.

Fall Semester (5 hours)

- MSE 7001 Residency Seminar I **1 credit hour**
- MSE 7820 Seminar in Mathematics and Science Education **1 credit hours**
- PSY 7190 Advanced Cognitive Psychology **3 credit hours**

Spring Semester (6 hours)

- MSE 7002 Residency Seminar II **1 credit hour**
- SPSE 7010 Educational Research Methodology **3 credit hours**
- MSE 7845 Nature of Mathematics and Science **2 credit hours OR**
- MSE 7848 Knowledge for Teaching in Mathematics and Science **2 credit hours**

Summer (3 hours)

- SPSE 7220 Advanced Educational Technology **3 credit hours OR**
- SPSE 7170 Learning Theories and the Educational Process **3 credit hours**

In addition, during the residency year, students are expected to complete each of the following:

- Attend at least one conference:** The conference should be directly related to the student's concentration (i.e., biology education, chemistry education, science education, mathematics education) and should be at the regional, national, or international level. The advisor must approve the selected conference.
- Submit a manuscript:** The manuscript will be prepared under the guidance of or in conjunction with MSE faculty. Residency seminars will support this process.

3. **Attend at least five (5) program activities not associated with course credit:** The MSE program has numerous activities that occur during the academic year (i.e., fall and spring semesters). These include seminars, book club meetings, reading/writing groups, journal clubs, etc. Some of these are intended for all MSE students while others are specific to concentrations.

Curriculum: Mathematics and Science Education, Mathematics Education

All Ph.D. candidates must complete 75 hours in the following course of study:

Core Courses (33 hours)

- MSE 7800 - Teaching Internship **3 credit hours**
 - MSE 7820 - Seminar in Mathematics and Science Education **1 credit hours** *
 - MSE 7845 - Nature of Mathematics and Science **2 credit hours**
 - MSE 7848 - Knowledge for Teaching in Mathematics and Science **2 credit hours**
 - MSE 7900 - Teaching and Learning Mathematics and Science **3 credit hours**
 - PSY 7190 - Advanced Cognitive Psychology **3 credit hours**
 - PSY 7280 - Psychological Statistics: Regression **3 credit hours** AND
 - PSY 7281 - Psychological Statistics: Regression Lab **0 credit hours**
 - PSY 7290 - Psychological Statistics: ANOVA **3 credit hours** AND
 - PSY 7291 - Psychological Statistics: ANOVA Lab **0 credit hours**
 - SPSE 7010 - Educational Research Methodology **3 credit hours**
 - SPSE 7170 - Learning Theories and the Educational Process **3 credit hours**
 - SPSE 7180 - Qualitative Evaluation and Research Methods **3 credit hours**
 - SPSE 7220 - Advanced Educational Technology **3 credit hours**
- *Students are required to take this course at least twice before candidacy.*

Concentration Core (18 hours)

- MATH 6900 - Research in Mathematics Education **3 credit hours**
- MATH 7310 - Theoretical Frameworks in Mathematics Education **3 credit hours**
- MATH 7320 - Mathematical Problem Solving **3 credit hours**
- MATH 7330 - Ethics in Mathematics Education **3 credit hours**
- MATH 7340 - History, Curriculum, and Policy in Mathematics Education **3 credit hours**
- MATH 7900 - Teaching and Learning Mathematics **3 credit hours**

Advised Mathematics Electives (12 hours)

Choose one:

- MATH 6330 - Algebra from an Advanced Perspective **3 credit hours**
- MATH 6340 - Geometry from an Advanced Perspective **3 credit hours**
- MATH 6350 - Probability and Statistics from an Advanced Perspective **3 credit hours**

Choose two:

- MATH 6120 - Advanced Linear Algebra **3 credit hours**
- MATH 6170 - Sets and Logic **3 credit hours**
- MATH 6190 - Analysis I **3 credit hours**

Choose one:

- MATH 6602 - Problems in Mathematics-Number Theory **1 to 9 credit hours (3 credit hours)**
- MATH 6603 - Problems in Mathematics-Mathematics of Finance **1 to 9 credit hours (3 credit hours)**
- MATH 6604 - Problems in Mathematics-Mathematics of Life Contingencies **1 to 9 credit hours (3 credit hours)**

Dissertation (12 hours)

- MSE 7640 - Dissertation Research in Mathematics and Science Education **1 to 6 credit hours**

Program Notes

Candidate must

1. file a degree plan with the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which they intend to graduate.

Mathematics and Science Education

MSE 7001 - Residency Seminar I

1 credit hours

Focuses on the transition of a student into a scholar. Attention is given to scholarly reading, scholarly discourse, and scholarly writing. Class meets for two hours on alternating weeks.

MSE 7002 - Residency Seminar II

1 credit hours

Focuses on the expectations placed on university faculty. Attention given to demands regarding teaching, research, and service. Class meets for two hours on alternating weeks.

MSE 7500 - Directed Research in Mathematics and Science Education

1 to 6 credit hours

For Ph.D. students. Selection of a research problem, review of pertinent literature, protocol design, collection and analysis of data, and preparation of results for publication. May be repeated multiple times for credit. Up to 6 hours of credit may be applied to the Mathematics and Science Education Ph.D. degree. S/U grading.

MSE 7640 - Dissertation Research in Mathematics and Science Education

1 to 6 credit hours

Selection of a research problem, review of pertinent literature, collection and analysis of data, and composition of the dissertation. Once enrolled, students must register for at least one credit hour of dissertation research each semester until completion. S/U grading.

MSE 7654 - Professional Seminar: Topic

1 to 3 credit hours

(Same as COMS 7654/MOBI 7654.) Focuses on a specific topic in a given semester. Topics include themes for advancing graduate students professional knowledge such as grant proposal preparation process, making successful presentations, and publishing research in the field. May be repeated with different topic.

MSE 7700 - Advanced Concepts in Mathematics and Science Education

3 or 4 credit hours

Covers advanced topics specific to different subdisciplines of mathematics and science education not covered in core or elective courses offered

through the program. Students will work under the direct supervision of the instructor. Involves lecture and/or laboratory components. Repeatable for 6-8 credit hours.

MSE 7800 - Teaching Internship

3 credit hours

Prerequisite: Permission of department. Admission based on recommendations and performance in teaching. Offered every term.

MSE 7810 - Teaching Internship

3 credit hours

Prerequisite: Permission of department. Admission based on recommendations and performance in teaching. Offered every term.

MSE 7820 - Seminar in Mathematics and Science Education

1 credit hours

Prerequisite: Must be currently enrolled in the Mathematics and Science Education Ph.D. program. Required of graduate students specializing in mathematics and science education. Involves presentations on current issues, related research, and policy developments in mathematics and science education. May be repeated.

MSE 7840 - Special Topics in Mathematics and Science Education

2 credit hours

Required of graduate students specializing in Mathematics and Science Education. May be repeated.

MSE 7845 - Nature of Mathematics and Science

2 credit hours

Focuses on the Nature of Mathematics (NOM) and the Nature of Science (NOS). Attention given to how the fields of mathematics, biology, and chemistry practiced as well as scientific inquiry, mathematical, practices, conceptions of NOS and NOM, and pedagogical considerations.

MSE 7848 - Knowledge for Teaching in Mathematics and Science

2 credit hours

Focuses on the knowledge required to be an effective teacher. Attention given to teacher knowledge constructs and the recognition of one's self as a mentor and teacher educator in formal and informal contexts.

**MSE 7900 - Teaching and Learning Mathematics
and Science**

3 credit hours

Focus on theoretical and practical issues regarding

how students learn mathematics and science, best practices for teaching mathematics and science topics, and issues from current literature on the teaching and learning of mathematics and science.

Molecular Biosciences, Ph.D.

Jason R. Jessen, Interim Program Director

(615) 898-2060

Jason.Jessen@mtsu.edu

The Doctor of Philosophy (Ph.D.) in Molecular Biosciences is an interdisciplinary program in the College of Basic and Applied Sciences that includes faculty from the departments of Biology, Chemistry, and Mathematical Sciences. It is a rigorous, research-oriented course of study that aims to help students develop an understanding of cellular function and biological mechanisms at a molecular scale.

All students in the program will be expected to complete a minimum of two consecutive semesters of full-time study in residence at MTSU. Only full-time students will be admitted.

Please see undergraduate catalog for information regarding undergraduate programs.

Admissions Requirements

Admission to the Ph.D. in Molecular Biosciences program is based on a comprehensive assessment of a candidate's qualifications, including

1. an earned bachelor's, master's, or doctoral degree from an accredited university or college in biochemistry, biology, chemistry, or a closely related subject. In addition, the following undergraduate courses are specifically recommended:
 - a. six semesters of a combination of general biology, microbiology, cell biology, genetics, and biochemistry courses, including some laboratory coursework;
 - b. two semesters of general/inorganic chemistry and at least one semester of organic chemistry, which should include a laboratory component;
 - c. two semesters of physics;
 - d. one semester of calculus.

NOTE: Students who lack any component of these minimum course requirements will be asked to remedy their deficiency or demonstrate competency in these areas.

2. an acceptable grade point average in all college work taken. Successful applicants typically have a minimum 3.50 GPA in their graduate work or a minimum 3.00 GPA when entering with a bachelor's degree.
3. acceptable scores on the Graduate Record Examination (GRE).
4. letters of recommendation that address the applicant's potential to successfully complete a Ph.D. in Molecular Biosciences.

NOTE: International students must also meet the College of Graduate Studies requirement for proof of English language proficiency. This may be accomplished by submission of TOEFL, UMELI, or IELTS scores that meet the college's requirements or by successful completion of level 112 of ELS coursework.

Applicants who do not meet these minimums but whose application materials indicate high potential for success may be admitted conditionally. Such students must meet the conditions of their admission in the time stated to remain in the program of study.

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

Application deadline: The application deadline is January 31 for those wishing to be considered for graduate assistantships for the following Fall. Late applications may be considered, but financial support is not guaranteed.

Applicant must

1. submit application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php).
2. submit official transcripts of all previous college work.
3. submit official scores for the verbal, quantitative, and analytical writing measures of the GRE that indicate potential for success in the Molecular Biosciences program. The GRE is an important measure and is given significant consideration in the admissions review process. Successful applicants typically have scores on

the Verbal and Quantitative measure at or above the 50th percentile for persons intending graduate study in science with a combined score that exceeds 297 (current scale) or 1,000 (former scale).

4. provide letters of recommendation from at least three professors or professionals that address the applicant's potential to successfully complete a Ph.D. in the Molecular Biosciences program.
5. submit a one- to two-page statement explaining why he/she is seeking a Ph.D. degree, listing areas of research interest, and indicating three professors in the program whose research he/she finds intriguing. Faculty research interests can be found at www.mtsu.edu/graduate/mbsphd/.

Degree Requirements

Students entering with a master's degree in a science discipline may have up to 16 graduate hours of previous coursework applied after determination that the content of the courses is directly equivalent to existing courses in the Molecular Biosciences curriculum.

Candidate must

1. complete 65 post-baccalaureate semester hours (see Curriculum section below for specifics);
2. make at least two research presentations at regional, national, or international meetings as the lead author or coauthor;
3. be lead author or make significant contribution as coauthor of two articles published, in press, or under review in high-quality, peer-reviewed journals;
4. in collaboration with an MTSU faculty member serving as principal investigator, make a significant contribution to the development of at least one external grant proposal;
5. complete a dissertation and successfully defend it in the final oral examination.

Curriculum: Molecular Biosciences

Candidate must complete 65 hours in the following course of study:

Core Courses (24 hours)

- MOBI 7010 - Lab Rotation in Molecular Biosciences **1 credit hours**
- MOBI 7100 - Experimental Design in Molecular Biosciences **3 credit hours**
- MOBI 7105 - Experimental Techniques in Molecular Biosciences **3 credit hours**
- MOBI 7205 - Dissertation Proposal Preparation in Molecular Biosciences **1 credit hours**
- MOBI 7300 - Current Topics in Scientific Literature and Communication in Molecular Biosciences I **2 credit hours** (Repeat for 4 hours total)
- MOBI 7400 - Current Topics in Scientific Literature and Communication in Molecular Biosciences II **2 credit hours** (Repeat for 12 hours total)

Electives (9 hours)

Each student, in consultation with his/her advisor and committee, will select at least 9 hours of elective coursework from at least two of the rubrics represented below. Other courses not listed below may be substituted with approval of the student's advisor and committee.

- BIOL 6220 - Herpetology **3 credit hours**
- BIOL 6270 - Cell Metabolism and Human Disease **3 credit hours**
- BIOL 6290 - Advanced Scanning Electron Microscopy **4 credit hours**
- BIOL 6360 - Energy Dispersive X-Ray Theory and Analysis **1 credit hours**
- BIOL 6390 - Advanced Cell and Molecular Biology **4 credit hours**
- BIOL 6410 - Advanced Transmitting Electron Microscopy **4 credit hours**
- BIOL 6430 - Clinical and Pathogenic Microbiology **4 credit hours**

- BIOL 6440 - Advanced Virology **4 credit hours**
- BIOL 6450 - Advancements in Molecular Genetics **4 credit hours**
- BIOL 6590 - Environmental Toxicology **4 credit hours**
- BIOL 6720 - Advanced Animal Development **4 credit hours**
- BIOL 6730 - Advanced Microbial Physiology and Biochemistry **4 credit hours**
- BIOL 6750 - Advanced Plant Biotechnology **4 credit hours**
- BIOL 6770 - Issues in Biotechnology **2 credit hours**
- BIOL 6780 - Principles of Systematics **4 credit hours**
- CHEM 6100 - Intermediate Organic Chemistry **3 credit hours**
- CHEM 6110 - Topics in Organic Chemistry **3 to 6 credit hours**
- CHEM 6230 - Intermediate Analytical Chemistry **4 credit hours**
- CHEM 6300 - Intermediate Physical Chemistry **3 credit hours**
- CHEM 6500 - Biochemistry I **3 credit hours**
- CHEM 6510 - Biochemistry II **3 credit hours**
- CHEM 6520 - Topics in Biochemistry **3 to 6 credit hours**
- CHEM 6530 - Biochemical Techniques **2 credit hours**
- CHEM 6610 - Environmental Chemistry **3 credit hours**
- CHEM 6720 - Topics in Physical Chemistry **3 to 6 credit hours**
- CHEM 7110 - Advanced Topics in Organic Chemistry **3 credit hours**
- CHEM 7510 - Advanced Biochemistry **3 credit hours**
- CHEM 7710 - Topics in Applied Chemistry **3 to 6 credit hours**
- MOBI 7010 - Lab Rotation in Molecular Biosciences **1 credit hours**
- MOBI 7200 - Biomolecular Modeling and Simulation **3 credit hours**
- MOBI 7654 - Professional Seminar: Topic **1 to 3 credit hours**
- MOBI 7700 - Advanced Concepts in Molecular Biosciences **3 or 4 credit hours**
- PHYS 7010 - Principles of Molecular Biophysics **3 credit hours**
- STAT 6604 - Problems in Statistics-Experimental Design **3 credit hours**
- STAT 7020 - Introduction to Biostatistics **3 credit hours**

Directed Research (16 hours)

- MOBI 7500 - Directed Research in Molecular Biosciences **1 to 99 credit hours**

Dissertation (16 hours)

- MOBI 7640 - Dissertation Research in Molecular Biosciences **1 to 99 credit hours**

Program Notes

Candidate must

1. file a degree plan with the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the semester in which candidate intends to graduate.

Molecular Biosciences

MOBI 7010 - Lab Rotation in Molecular Biosciences

1 credit hours

Prerequisite: Admission to the MOBI doctoral program. Explores three molecular bioscience research environments for five weeks each.

MOBI 7100 - Experimental Design in Molecular Biosciences

3 credit hours

Prerequisite: Admission to the MOBI doctoral program. Explores ethics, experimental design, and statistical considerations relevant to molecular biosciences.

MOBI 7105 - Experimental Techniques in Molecular Biosciences

3 credit hours

Prerequisite: Admission to the MOBI doctoral program. Explores current and emerging methods in molecular bioscience.

MOBI 7200 - Biomolecular Modeling and Simulation

3 credit hours

Prerequisites: Differential equations and linear algebra. Introduces the modeling of biomolecular structure and dynamics. Covers three broad topics: (a) biomolecular structure; (b) molecular force field origin, composition, and evaluation techniques; and (c) simulation techniques-computational sampling by geometric optimization, Monte Carlo methods, and molecular dynamics.

MOBI 7205 - Dissertation Proposal Preparation in Molecular Biosciences

1 credit hours

Prerequisite: Admission to the MOBI doctoral program. Preparation of dissertation proposal with the research mentor.

MOBI 7300 - Current Topics in Scientific Literature and Communication in Molecular Biosciences I

2 credit hours

Prerequisite: Admission to the MOBI doctoral program. Explores current primary literature and practices scientific communication skills at the introductory level.

MOBI 7400 - Current Topics in Scientific Literature and Communication in Molecular Biosciences II

2 credit hours

Prerequisite: Admission to the MOBI doctoral program. Explores current topic-specific primary literature and practices scientific communication skills at the professional level.

MOBI 7500 - Directed Research in Molecular Biosciences

1 to 99 credit hours

For Ph.D. students prior to advancement to candidacy. Selection of a research problem, review of pertinent literature, protocol design, collection and analysis of data and preparation of results for publication. S/U grading.

MOBI 7640 - Dissertation Research in Molecular Biosciences

1 to 99 credit hours

For Ph.D. candidates. Ongoing investigation of a research problem, review of pertinent literature, protocol design, collection and analysis of data and preparation of results for publication and as Ph.D. dissertation. Students must complete a total of at least 12 hours to earn degree. S/U grading.

MOBI 7654 - Professional Seminar: Topic

1 to 3 credit hours

(Same as COMS 7654/MSE 7654.) Focuses on a specific topic in a given semester. Topics include themes for advancing graduate students professional knowledge such as grant proposal preparation process, making successful presentations, and publishing research in the field. May be repeated with different topic.

MOBI 7700 - Advanced Concepts in Molecular Biosciences

3 or 4 credit hours

Covers advanced topics and protocols specific to different subdisciplines in molecular biosciences not covered in core or elective courses offered through the program. Students work under the direct supervision of the instructor; coursework will involve lecture and/or laboratory components. Repeatable for 6 to 8 credit hours.

Professional Science, Actuarial Sciences Concentration, M.S.

Saeed Foroudastan, Director
Master of Science in Professional Science Program
(615) 494-7618
Saeed.Foroudastan@mtsu.edu

For more information about the Actuarial Sciences concentration, contact:

Don Hong, Program Coordinator
Actuarial Sciences Concentration
(615) 904-8339
Don.Hong@mtsu.edu

Carey Snowden, Graduate Coordinator
Master of Science in Professional Science Program
(615) 904-8581
Carey.Snowden@mtsu.edu

The College of Basic and Applied Sciences offers the Master of Science with a major in Professional Science (M.S.) with six concentrations: Actuarial Sciences, Biostatistics, Biotechnology, Engineering Management, Geosciences, and Health Care Informatics.

The concentration in Actuarial Sciences offers preparation, basic knowledge, and professional skills to work as an actuary and to pass actuarial professional examinations.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admission to the Master of Science in Professional Science with a concentration in Actuarial Sciences requires

1. an earned bachelor's degree from an accredited university or college with a course in Multivariate Calculus (MATH 3110 or the equivalent) with a grade of C (2.00) or better and a course in Linear Algebra (MATH 2010 or equivalent) with a grade of C (2.00) or better;
2. basic competency in word processing, electronic mail, library retrieval systems, presentation graphics, spreadsheets, and databases;
3. appropriate undergraduate preparation for advanced study of actuarial sciences.

Application Procedure

All application materials are to be submitted to the College of Graduate Studies.

Applicant must

1. submit application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit official transcripts from all collegiate institutions attended;
3. submit three letters of reference to graduate@mtsu.edu (or mail to College of Graduate Studies);
4. submit an official Graduate Record Examination (GRE) report. A composite GRE score of 286 (current scale) or 900 (former scale) is expected for consideration for unconditional admission.

Degree Requirements

Once admitted to the program, each candidate must complete a minimum of 36 semester hours of graduate credit (see specifics in Curriculum section below).

Curriculum: Professional Science, Actuarial Sciences

Candidate must complete 36 hours in the following course of study:

Core Courses (15 hours)

- ACTG 6100 - Accounting and Legal Issues for Managers **3 credit hours**
- BCED 6820 - Managerial Communication **3 credit hours**
- BCED 6910 - Internship Program **3 credit hours**
- MGMT 6740 - Leadership and Motivation **3 credit hours**
- STAT 5140 - Probabilistic and Statistical Reasoning **3 credit hours**

Concentration Courses (21 hours)

Required Courses (9 hours)

- ACSI 6020 - Construction and Evaluation of Actuarial Models **3 credit hours**
- ACSI 6030 - Actuarial Models for Life Contingencies **3 credit hours**
- ACSI 6040 - Actuarial Models for Financial Economics **3 credit hours**

Four courses from the following (12 hours):

- ACSI 5220 - Mathematics of Corporation Finance **3 credit hours**
- ACSI 5230 - Mathematics of Compound Interest **3 credit hours**
- ACSI 5240 - Mathematics of Interest Theory, Economics, and Finance **3 credit hours**
- ACSI 5330 - Actuarial Mathematics I **3 credit hours**
- ACSI 5630 - Mathematics of Risk Management **3 credit hours**
- ACSI 5640 - Mathematics of Options, Futures, and Other Derivatives **3 credit hours**
- ACSI 6010 - Credibility Theory and Loss Distributions **3 credit hours**
- ACSI 6600 - Problems in Actuarial Science **1 to 6 credit hours**
- ECON 6060 - Econometrics I **3 credit hours**
- ECON 6070 - Econometrics II **3 credit hours**
- STAT 5200 - Statistical Methods for Forecasting **3 credit hours**
- STAT 6160 - Advanced Mathematical Statistics I **3 credit hours**
- STAT 6180 - Advanced Mathematical Statistics II **3 credit hours**
- MATH 6601 - Problems in Mathematics-Advanced Calculus **1 to 9 credit hours** OR
- MATH 6602 - Problems in Mathematics-Number Theory **1 to 9 credit hours** OR
- MATH 6603 - Problems in Mathematics-Mathematics of Finance **1 to 9 credit hours** OR
- MATH 6604 - Problems in Mathematics-Mathematics of Life Contingencies **1 to 9 credit hours** OR
- MATH 6605 - Problems in Mathematics-Numerical Analysis **1 to 9 credit hours** OR
- MATH 6606 - Problems in Mathematics-Topology **1 to 9 credit hours** OR
- MATH 6607 - Problems in Mathematics-Abstract Algebra **1 to 9 credit hours** OR
- MATH 6608 - Problems in Mathematics-Combinatorics and Graph Theory **1 to 9 credit hours**

Program Notes

Candidate must

1. file a degree plan in the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which candidate intends to graduate.

Professional Science, Biostatistics Concentration, M.S.

Saeed Foroudastan, Director
Master of Science in Professional Science Program
(615) 494-7618
Saeed.Foroudastan@mtsu.edu

For more information about the Biostatistics concentration, contact:

Lisa Green, Program Coordinator
Biostatistics Concentration
(615) 898-5775
Lisa.Green@mtsu.edu

Carey Snowden, Graduate Coordinator
Master of Science in Professional Science Program
(615) 904-8581
Carey.Snowden@mtsu.edu

The College of Basic and Applied Sciences offers the Master of Science with a major in Professional Science (M.S.) with six concentrations: Actuarial Sciences, Biostatistics, Biotechnology, Engineering Management, Geosciences, and Health Care Informatics.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admission to the Master of Science in Professional Science with a concentration in Biostatistics requires

1. an earned bachelor's degree from an accredited university or college with a course in multivariate calculus with a grade of C (2.00) or better and a course in linear algebra with a grade of C (2.00) or better;
2. basic competency in word processing, electronic mail, library retrieval systems, presentation graphics, spreadsheets, and databases;
3. the appropriate undergraduate preparation for advanced study of biostatistics.

Once accepted into the College of Graduate Studies, students interested in the Master of Science in Professional Science program may enroll for one semester before being fully admitted to the program.

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

Applicant must

1. submit application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit official transcripts from all collegiate institutions attended;;
3. submit three letters of reference to graduate@mtsu.edu (or mail to College of Graduate Studies);
4. submit an official Graduate Record Examination (GRE) report. A composite GRE score of 286 (current scale) or 900 (former scale) is expected for consideration for unconditional admission.

Degree Requirements

Once admitted to the program, each candidate must complete a minimum of 36 semester hours of graduate credit (see specifics in Curriculum section, below).

Curriculum: Professional Science, Biostatistics

Candidate must complete 36 hours in the following course of study:

Core Courses (15 hours)

- BCED 6820 - Managerial Communication **3 credit hours**
- BCED 6910 - Internship Program **3 credit hours**
- ACTG 6100 - Accounting and Legal Issues for Managers **3 credit hours**
- MGMT 6740 - Leadership and Motivation **3 credit hours**
- STAT 5140 - Probabilistic and Statistical Reasoning **3 credit hours**

Concentration Courses (21 hours)

- STAT 6020 - Introduction to Biostatistics **3 credit hours**
- STAT 6160 - Advanced Mathematical Statistics I **3 credit hours**
- STAT 6180 - Advanced Mathematical Statistics II **3 credit hours**
- STAT 6510 - Biostatistical Methods **3 credit hours**
- STAT 6520 - Advanced Biostatistical Methods **3 credit hours**

Six hours from the following:

- STAT 6602 - Problems in Statistics-Regression Analysis **3 credit hours**
- STAT 6603 - Problems in Statistics-Nonparametric Statistics **3 credit hours**
- STAT 6604 - Problems in Statistics-Experimental Design **3 credit hours**
- STAT 6605 - Problems in Statistics-SAS Programming **1 to 9 credit hours**

Program Notes

Candidate must

1. file a degree plan in the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which candidate intends to graduate.

Professional Science, Biotechnology Concentration, M.S.

Saeed Foroudastan, Director
Master of Science in Professional Science Program
(615) 494-7618
Saeed.Foroudastan@mtsu.edu

For more information about the Biotechnology concentration, contact
Rebecca Seipelt-Thiemann, Program Coordinator
Biotechnology Concentration
(615) 904-8393
Rebecca.Seipelt@mtsu.edu

Carey Snowden, Graduate Coordinator
Master of science in Professional Science Program
(615) 904-8581
Carey.Snowden@mtsu.edu

The College of Basic and Applied Sciences offers the Master of Science with a major in Professional Science (M.S.) with six concentrations: Actuarial Sciences, Biostatistics, Biotechnology, Engineering Management, Geosciences, and Health Care Informatics.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admission to the Master in Science in Professional Science with a concentration in Biotechnology requires

1. an earned bachelor's degree from an accredited university or college with a major in biology or chemistry or another major. Student must have taken organic chemistry and at least three undergraduate courses related to biotechnology, including genetics;
2. basic competency in word processing, electronic mail, library retrieval systems, presentation graphics, spreadsheets, and databases;
3. the appropriate undergraduate preparation for advanced study of Biotechnology.

Once accepted into the College of Graduate Studies, students interested in the Master of Science in Professional Science program may enroll for one semester before being fully admitted to the program.

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

Applicant must

1. submit application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit official transcripts from all collegiate institutions attended;
3. submit three letters of reference to graduate@mtsu.edu (or mail to College of Graduate Studies);
4. submit an official Graduate Record Examination (GRE) report. A composite GRE score of 286 (current scale) or 900 (former scale) is expected for consideration for unconditional admission.

Degree Requirements

Once admitted to the program, each candidate must complete a minimum of 36 semester hours of graduate credit (see specifics in Curriculum section below).

Curriculum: Professional Science, Biotechnology

Candidate must complete 36 hours in the following course of study:

Core Courses (15 hours)

- ACTG 6100 - Accounting and Legal Issues for Managers **3 credit hours**
- BCED 6820 - Managerial Communication **3 credit hours**
- BCED 6910 - Internship Program **3 credit hours**
- MGMT 6740 - Leadership and Motivation **3 credit hours**
- STAT 5140 - Probabilistic and Statistical Reasoning **3 credit hours**

Concentration Courses (21 hours)

Required (5 hours)

- BIOL 5550 - Biotechnology **3 credit hours**
- BIOL 6770 - Issues in Biotechnology **2 credit hours**

16 hours from the following:

- BIOL 5460 - Human Genetics **3 credit hours** AND
- BIOL 5461 - Human Genetics Lab **0 credit hours**
- BIOL 5510 - Food and Industrial Microbiology **4 credit hours**
- BIOL 6350 - Biostatistical Analysis **4 credit hours** AND
- BIOL 6351 - Biostatistical Analysis Lab **0 credit hours**
- BIOL 6380 - Experimental Immunology **4 credit hours** AND
- BIOL 6381 - Experimental Immunology Lab **0 credit hours**
- BIOL 6390 - Advanced Cell and Molecular Biology **4 credit hours** AND
- BIOL 6391 - Advanced Cell and Molecular Biology Lab **0 credit hours**
- BIOL 6410 - Advanced Transmitting Electron Microscopy **4 credit hours**
- BIOL 6430 - Clinical and Pathogenic Microbiology **4 credit hours**
- BIOL 6440 - Advanced Virology **4 credit hours**
- BIOL 6450 - Advancements in Molecular Genetics **4 credit hours**
- BIOL 6500 - Special Problems in Biology **4 credit hours**
- BIOL 6590 - Environmental Toxicology **4 credit hours**
- BIOL 6650 - Seminar **1 credit hours**
- BIOL 6660 - Seminar **2 credit hours**
- BIOL 6720 - Advanced Animal Development **4 credit hours** AND
- BIOL 6721 - Advanced Animal Development Lab **0 credit hours**
- BIOL 6730 - Advanced Microbial Physiology and Biochemistry **4 credit hours**
- BIOL 6750 - Advanced Plant Biotechnology **4 credit hours**
- BIOL 6760 - Bioinformatics **4 credit hours**
- CHEM 6510 - Biochemistry II **3 credit hours**
- CHEM 6530 - Biochemical Techniques **2 credit hours**

Program Notes

Candidate must

1. file a degree plan in the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which candidate intends to graduate.

Professional Science, Engineering Management Concentration, M.S.

Saeed Foroudastan, Director
Master of Science in Professional Science Program
(615) 494-7618
Saeed.Foroudastan@mtsu.edu

For more information about the Engineering Management concentration, contact:
Vahid Khiabani, Program Coordinator
Engineering Management Concentration
(615) 898-5525
Vahid.Khiabani@mtsu.edu

Carey Snowden, Graduate Coordinator
Master of Science in Professional Science Program
(615) 904-8581
Carey.Snowden@mtsu.edu

The College of Basic and Applied Sciences offers the Masters of Science with a major in Professional Science (M.S.) with six concentrations: Actuarial Sciences, Biostatistics, Biotechnology, Engineering Management, Geosciences, and Health Care Informatics.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admissions to the Master of Science in Professional Science with a concentration in Engineering Management requires

1. an earned bachelor's degree from an accredited university or college with a major in Engineering or related areas;
2. basic competency in word processing, electronic mail, library retrieval systems, presentation graphics, spreadsheets, and databases.

Once accepted into the College of Graduate Studies, students in the Master of Science in Professional Science program may enroll for one semester before fully admitted to the program.

Admission Procedures

All application materials are to be submitted to the College of Graduate Studies.

Applicant must

1. submit application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit official transcripts from all collegiate institutions attended;
3. submit three letters of reference to graduate@mtsu.edu (or mail to College of Graduate Studies);
4. submit an official Graduate Record Examination (GRE) report. A composite GRE of 286 (current scale) or 900 (former scale) is expected for consideration for unconditional admission.

Degree Requirements

Once admitted to the program, each candidate must complete a minimum of 36 semester hours of graduate credit.

Curriculum: Professional Science, Engineering Management

Candidates must complete 36 hours in the following course of study.

Core Courses (15 hours)

- ACTG 6100 - Accounting and Legal Issues for Managers **3 credit hours**
- BCED 6820 - Managerial Communication **3 credit hours**
- BCED 6910 - Internship Program **3 credit hours**
- MGMT 6740 - Leadership and Motivation **3 credit hours**
- STAT 5140 - Probabilistic and Statistical Reasoning **3 credit hours**

Concentration Courses (21 hours)

- ET 6010 - Safety Planning **3 credit hours**
- ET 6190 - Six Sigma **3 credit hours**
- ET 6300 - PMI Project Management **3 credit hours**
- ET 6390 - Productivity Strategies/Lean Systems **3 credit hours**
- ET 6620 - Methods of Research **3 credit hours**
- ET 6870 - Engineering Management Systems **3 credit hours**
- ET 6810 - Engineering Management Theory and Application **3 credit hours** OR
- ET 6520 - Advanced Topics in Technology **3 credit hours**

Program Notes

Candidate must

1. file a degree plan in the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which the candidate intends to graduate.

Professional Science, Geosciences Concentration, M.S.

Saeed Foroudastan, Director
Professional Science
(615) 494-7618
Saeed.Foroudastan@mtsu.edu

For more information about the Geosciences concentration, contact:
Clay Harris, Program Coordinator
Geosciences Concentration
(615) 904-8019
Clay.Harris@mtsu.edu

Carey Snowden, Graduate Coordinator
Master of Science in Professional Science Program
(615)904-8581
Carey.Snowden@mtsu.edu

The College of Basic and Applied Sciences offers the Master of Science with a major in Professional Science (M.S.) with six concentrations: Actuarial Sciences, Biostatistics, Biotechnology, Engineering Management, Geosciences, and Health Care Informatics.

The concentration in Actuarial Sciences offers preparation, basic knowledge, and professional skills to work as an actuary and to pass actuarial professional examinations.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admission to the Master of Science in Professional Science with a concentration in Geosciences requires

1. an earned bachelor's degree from an accredited university or college with a major in geosciences, anthropology, or related areas;
2. basic competency in word processing, electronic mail, library retrieval systems, presentation graphics, spreadsheets, and databases.

Once accepted into the College of Graduate Studies, students in the Master of Science in Professional Science program may enroll for one semester before fully admitted to the program.

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

Applicant must

1. submit application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php)
2. submit official transcripts from all collegiate institutions attended;
3. submit three letters of reference to graduate.mtsu.edu (or mail to College of Graduate Studies);
4. submit an official Graduate Record Examination (GRE) report. A composite GRE score of 286 (current scale) or 900 (former scale) is expected for consideration for unconditional admission.

Degree Requirements

Once admitted to the program, each candidate must complete a minimum of 36 semester hours of graduate credit.

Curriculum: Professional Science, Geosciences

Candidates must complete 36 hours in the following course of study:

Core Courses (15 hours)

- ACTG 6100 - Accounting and Legal Issues for Managers **3 credit hours**
- BCED 6820 - Managerial Communication **3 credit hours**
- BCED 6910 - Internship Program **3 credit hours**
- MGMT 6740 - Leadership and Motivation **3 credit hours**
- STAT 5140 - Probabilistic and Statistical Reasoning **3 credit hours**

Track: Geographic Information Systems

Concentration Courses (21 hours)

- GEOL 6030 - Geosciences Colloquium **2 credit hours** (*required for all tracks*)
- PGEO 5560 - Intermediate Geographic Information Systems **3 credit hours**
- PGEO 5570 - Advanced Geographic Information Systems **3 credit hours**
- PGEO 6040 - Geospatial Systems and Applications **4 credit hours**
- PGEO 6050 - Programming for Geospatial Database Applications **3 credit hours**
- INFS 6710 - IT Systems Development Project Management **3 credit hours**
- **One of the following:**
- INFS 6500 - IT Project Management Planning and Implementation **3 credit hours**
- INFS 6510 - IT Project Risk Assessment and Control **3 credit hours**
- INFS 6520 - IT Project Management Case Studies **3 credit hours**

Track: Environmental Geosystems

Concentration Courses (21 hours)

- GEOL 6030 - Geosciences Colloquium **2 credit hours** (*required for all tracks*)
- PGEO 6040 - Geospatial Systems and Applications **4 credit hours**
- GEOL 5040 - Engineering Geology **3 credit hours**
- GEOL 6000 - Environmental Geosystems **3 credit hours**
- GEOL 6010 - Case Studies in Environmental Geosystems **3 credit hours**
- GEOL 6020 - Advanced Hydrogeology **3 credit hours**
- **One of the following:**
- PLSO 5340 - Soil Formation and Remediation **3 credit hours**
- PLSO 5350 - Soil Survey and Land Use **3 credit hours**
- GEOL 5150 - Environmental Applications of Hydrogeology **3 credit hours**

Track: General Geosciences

Concentration Courses (21 hours)

- GEOL 6030 - Geosciences Colloquium **2 credit hours** (*required for all tracks*)
At least 12 hours from the following:
- PGEO 6040 - Geospatial Systems and Applications **4 credit hours**
- PGEO 6050 - Programming for Geospatial Database Applications **3 credit hours**
- GEOL 6000 - Environmental Geosystems **3 credit hours**
- GEOL 6010 - Case Studies in Environmental Geosystems **3 credit hours**
- GEOL 6020 - Advanced Hydrogeology **3 credit hours**
No more than 7 hours from the following:
- GEOG 5320 - Economic Geography **3 credit hours**
- GEOG 5330 - Political Geography **3 credit hours**
- GEOG 5340 - Historical Geography **3 credit hours**
- GEOG 5370 - Urban Geography **3 credit hours**
- GEOG 5420 - Geography of Latin America **3 credit hours**
- PGEO 5380 - Cartography **4 credit hours**
- GEOG 5402 - Field Course **4 credit hours**
- GEOG 5410 - Geography of the United States and Canada **3 credit hours**
- GEOG 5430 - Geography of Europe **3 credit hours**
- PGEO 5401 - Field Studies in Physical Geography **4 credit hours**
- PGEO 5490 - Remote Sensing **4 credit hours**
- PGEO 5510 - Laboratory Problems in Remote Sensing **4 credit hours**
- PGEO 5520 - Image Interpretation **4 credit hours**
- PGEO 5560 - Intermediate Geographic Information Systems **3 credit hours**
- PGEO 5570 - Advanced Geographic Information Systems **3 credit hours**
- GEOL 5000 - Petrology and Petrography **4 credit hours**
- GEOL 5020 - Geomorphic Regions of the United States **4 credit hours**
- GEOL 5030 - Invertebrate Micropaleontology **4 credit hours**
- GEOL 5040 - Engineering Geology **3 credit hours**
- GEOL 5050 - Meteorology **3 credit hours**
- GEOL 5060 - Principles of Geoscience **4 credit hours**
- GEOL 5070 - Sedimentation and Stratigraphy **4 credit hours**
- GEOL 5080 - Structural Geology **3 credit hours**
- GEOL 5100 - Geophysical Prospecting **4 credit hours**
- GEOL 5130 - Hydrogeology **5 credit hours**
- GEOL 5140 - Inorganic Geochemistry **3 credit hours**
- GEOL 5150 - Environmental Applications of Hydrogeology **3 credit hours**
- GEOL 5401 - Field Course **4 credit hours**
- GEOL 5402 - Field Course **4 credit hours**
- INFS 6500 - IT Project Management Planning and Implementation **3 credit hours**
- INFS 6510 - IT Project Risk Assessment and Control **3 credit hours**
- INFS 6520 - IT Project Management Case Studies **3 credit hours**
- INFS 6710 - IT Systems Development Project Management **3 credit hours**

Program Notes

Candidate must

1. file a degree plan in the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which the candidate intends to graduate.

Professional Science, Health Care Informatics Concentration, M.S.

Saeed Foroudastan, Director
Master of Science in Professional Science Program
(615) 494-7618
Saeed.Foroudastan@mtsu.edu

For more information about the Health Care Informatics concentration, contact:

Carey Snowden, Graduate Coordinator
Master of Science in Professional Science Program
(615) 904-8581
Carey.Snowden@mtsu.edu

The College of Basic and Applied Sciences offers the Master of Science with a major in Professional Science (M.S.) with six concentrations: Actuarial Sciences, Biostatistics, Biotechnology, Engineering Management, Geosciences, and Health Care Informatics.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admission to the Master of Science in Professional Science with a concentration in Health Care Informatics requires

- an undergraduate or graduate degree in a relevant field including the health sciences, information technology, allied health professions, business, or statistics, and a commitment to developing the necessary analytic and program management skills and expertise required of today's health informatics professional. Contact the program coordinator if you have questions about the relevance of your degree.
- applicants possessing intermediate proficiency with multiple computer programs, including but not limited to word processing, data management/presentation, and statistical analysis packages commonly used in business and healthcare industries. Familiarity with these programs is required and serves as the foundation upon which other skill sets are developed.

NOTE: Applicants with backgrounds and experience outside of the common student profiles described above, or without a relevant degree or work experience, may be conditionally admitted to our program, with the expectation that the admitted student complete appropriate prerequisite coursework. Contact the program coordinator for details or for more information.

Once accepted into the College of Graduate Studies, students interested in the Master of Science in Professional Science program may enroll for one semester before being fully admitted to the program.

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

Applicant must

1. submit application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit official transcripts from all collegiate institutions attended;
3. submit three letters of reference from mentors/colleagues able to speak to your ability to succeed at graduate study in health care informatics.

Degree Requirements

Once admitted to the program, each candidate must complete a minimum of 36 semester hours of graduate credit (see specifics in Curriculum section below).

Curriculum: Professional Science, Health Care Informatics

Candidate must complete 36 hours in the following course of study:

Core Courses (15 hours)

- ACTG 6100 - Accounting and Legal Issues for Managers **3 credit hours**
- BCED 6820 - Managerial Communication **3 credit hours**
- BCED 6910 - Internship Program **3 credit hours**
- MGMT 6740 - Leadership and Motivation **3 credit hours**
- STAT 5140 - Probabilistic and Statistical Reasoning **3 credit hours**

Concentration Courses (21 hours)

- BLAW 6500 - Legal Aspects of Healthcare **3 credit hours**
- ET 6300 - PMI Project Management **3 credit hours**
- MBAI 6835 - IT Applications for Decision Making **2 credit hours**
- MBAI 6905 - Applied Business Analytics **3 credit hours**
- INFS 6300 - IS Security: Management and Assurance **3 credit hours**
- Topics in Contemporary Health Care **2 credit hours**
- Applied Health Care Data Management **2 credit hours**
- **One course from:**
- BIA 6910 - Business Intelligence **3 credit hours**
- ET 6190 - Six Sigma **3 credit hours**
- ET 6010 - Safety Planning **3 credit hours**
- ET 6390 - Productivity Strategies/Lean Systems **3 credit hours**
- ET 6870 - Engineering Management Systems **3 credit hours**

Program Notes

Candidate must

1. file a degree plan in the College of Graduate Studies prior to admission into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which candidate intends to graduate.

Aerospace

Wendy Beckman, Chair

(615) 898-2788

mtsu.edu/aerospace

The Department of Aerospace offers the Master of Science (M.S.) in Aeronautical Science with concentrations in Aviation Management, Aviation Education, and Aviation Safety and Security Management. A minor in Aerospace is also offered.

Aeronautical Science, Aviation Education Concentration, M.S.

Paul Craig, Program Director

(615) 494-8637

Paul.Craig@mtsu.edu

The Department of Aerospace offers the Master of Science (M.S.) in Aeronautical Science with concentrations in Aviation Education, Aviation Management, and Aviation Safety and Security Management.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admission decisions are based on a holistic assessment of an applicant's credentials. Applicants must have graduated from an accredited four-year college or university with a minimum 3.00 GPA. Completion of the Graduate Record Exam (GRE), Miller Analogies Test (MAT), or Graduate Management Admissions Test (GMAT) with an acceptable score (typically in the 50th percentile for the test selected) is required. Three letters of recommendation from academic or professional acquaintances and a personal statement are also required. The personal statement should be approximately 400 words and should outline the student's academic interests, potential area(s) of research interest, and professional goals. Undergraduate transcripts must reflect 15 semester hours of aviation coursework. Applicants with undergraduate majors in fields other than aviation will be required to complete AERO 1010 and AERO 1020 during their first semester in the M.S. program and 9 additional hours of undergraduate aviation courses prior to the completion of 21 hours of graduate credit. Applicants holding Federal Aviation Administration certificates may receive credit for AERO 1010 and AERO 1020.

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

Applicant must

1. submit an application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit three letters of recommendation from professors or professionals that address the applicant's potential to successfully complete an M.S. program in Aviation Administration;
3. submit official scores on the Graduate Record Examination (GRE), Miller Analogies Test (MAT), or Graduate Management Admissions Test (GMAT).
4. submit official transcripts of all previous college work.
5. submit a personal statement.

Degree Requirements

The Master of Science in Aeronautical Science with a concentration in Aviation Education requires completion of 36 semester hours. Student must select the thesis or non-thesis option.

Candidate must

1. successfully complete a written comprehensive examination (may be taken no more than twice) the semester in which the candidate intends to graduate;
2. successfully complete a thesis or non-thesis option.

Curriculum: Aeronautical Science, Aviation Education

Thesis Option (36 hours)

Core Courses (21 hours)

- AERO 6120 - Aviation History **3 credit hours**
- AERO 6130 - Aviation Safety Management **3 credit hours**
- AERO 6150 - Aviation Industries **3 credit hours**
- AERO 6610 - Introduction to Aerospace Research **3 credit hours**
- AERO 6611 - Applied Statistics in Aerospace Research **3 credit hours**
- AERO 6640 - Thesis Research **1 to 6 credit hours (6 credit hours)**

Required Education Courses (6 hours)

- SPSE 6430 - Introduction to Curriculum Development **3 credit hours**
- FOED 6020 - Educational Foundations **3 credit hours**

Education Electives (6 hours)

- SPSE 6250 - Seminar in Curriculum Improvement **3 credit hours**
- SPSE 6520 - Studies in Education: Curriculum **1 to 3 credit hours**
- SPSE 6900 - Online Learning and Instructional Design **3 credit hours**
- YOED 6680 - Issues and Trends in Teaching and Learning **3 credit hours**

Aerospace Electives (3 hours)

- AERO 6050 - Aerospace Internship I **3 credit hours**
- AERO 6100 - Aviation Education Workshop **3 credit hours**
- AERO 6170 - Scheduled Air Carrier Operations **3 credit hours**
- AERO 6310 - Introduction to Aviation Security **3 credit hours**
- AERO 6330 - International Aviation Systems **3 credit hours**
- AERO 6350 - General Aviation **3 credit hours**
- AERO 6430 - Human Factors in Aviation **3 credit hours**

Non-Thesis Option (36 hours)

Core Courses (18 hours)

- AERO 6120 - Aviation History **3 credit hours**
- AERO 6130 - Aviation Safety Management **3 credit hours**
- AERO 6150 - Aviation Industries **3 credit hours**
- AERO 6610 - Introduction to Aerospace Research **3 credit hours**
- AERO 6611 - Applied Statistics in Aerospace Research **3 credit hours**
- AERO 6441 - Applied Research Capstone Project **3 credit hours**

Required Education Courses (6 hours)

- SPSE 6430 - Introduction to Curriculum Development **3 credit hours**
- FOED 6020 - Educational Foundations **3 credit hours**

Education Electives (6 hours)

- SPSE 6250 - Seminar in Curriculum Improvement **3 credit hours**
- SPSE 6520 - Studies in Education: Curriculum **1 to 3 credit hours**
- SPSE 6900 - Online Learning and Instructional Design **3 credit hours**
- YOED 6680 - Issues and Trends in Teaching and Learning **3 credit hours**

Aerospace Electives (6 hours)

- AERO 6050 - Aerospace Internship I **3 credit hours**
- AERO 6100 - Aviation Education Workshop **3 credit hours**
- AERO 6170 - Scheduled Air Carrier Operations **3 credit hours**
- AERO 6310 - Introduction to Aviation Security **3 credit hours**
- AERO 6330 - International Aviation Systems **3 credit hours**
- AERO 6350 - General Aviation **3 credit hours**
- AERO 6430 - Human Factors in Aviation **3 credit hours**

Program Notes

Candidate must

1. file a degree plan in the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which candidate intends to graduate.

Aeronautical Science, Aviation Management Concentration, M.S.

Paul Craig, Program Director

(615) 494-8637

Paul.Craig@mtsu.edu

The Department of Aerospace offers the Master of Science (M.S.) in Aeronautical Science with concentrations in Aviation Education, Aviation Management, and Aviation Safety and Security Management.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admission decisions are based on a holistic assessment of an applicant's credentials. Applicants must have graduated from an accredited four-year college or university with a minimum 3.00 GPA. Completion of the Graduate Record Exam (GRE), Miller Analogies Test (MAT), or Graduate Management Admissions Test (GMAT) with an acceptable score (typically in the 50th percentile for the test selected) is required. Three letters of recommendation from academic or professional acquaintances and a personal statement are also required. The personal statement should be approximately 400 words and should outline the student's academic interests, potential area(s) of research interest, and professional goals. Undergraduate transcripts must reflect 15 semester hours of aviation coursework. Applicants with undergraduate majors in fields other than aviation will be required to complete AERO 1010 and AERO 1020 during their first semester in the M.S. program and 9 additional hours of undergraduate aviation courses prior to the completion of 21 hours of graduate credit. Applicants holding Federal Aviation Administration certificates may receive credit for AERO 1010 and AERO 1020.

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

Applicant must

1. submit an application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit three letters of recommendation from professors or professionals that address the applicant's potential to successfully complete an M.S. program in Aviation Administration;
3. submit official scores on the Graduate Record Examination (GRE), Miller Analogies Test (MAT), or Graduate Management Admissions Test (GMAT).
4. submit official transcripts of all previous college work.
5. submit personal statement.

Degree Requirements

The Master of Science in Aeronautical Science with a concentration in Aviation Management requires completion of 36 semester hours. Candidates must select the thesis or non-thesis option.

Candidate must

1. successfully complete a written comprehensive examination (may be taken no more than twice) the semester in which the candidate intends to graduate;
2. successfully complete a thesis or applied research capstone project.

Curriculum: Aeronautical Science, Aviation Management

Thesis Option (36 hours)

Core Courses (21 hours)

- AERO 6120 - Aviation History **3 credit hours**
- AERO 6130 - Aviation Safety Management **3 credit hours**
- AERO 6150 - Aviation Industries **3 credit hours**
- AERO 6610 - Introduction to Aerospace Research **3 credit hours**
- AERO 6611 - Applied Statistics in Aerospace Research **3 credit hours**
- AERO 6640 - Thesis Research **1 to 6 credit hours (6 credit hours required)**

Required Courses (12 hours)

- AERO 6170 - Scheduled Air Carrier Operations **3 credit hours**
- AERO 6190 - Airport Organizational Structures and Operational Activities **3 credit hours**
- AERO 6250 - Airport Policy and Planning **3 credit hours**
- AERO 6370 - Aviation Contracts and Leases **3 credit hours**

Electives (3 hours)

- AERO 6050 - Aerospace Internship I **3 credit hours**
- AERO 6220 - Environmental Policy **3 credit hours**
- AERO 6270 - Airport Design **3 credit hours**
- AERO 6330 - International Aviation Systems **3 credit hours**
- AERO 6350 - General Aviation **3 credit hours**

Non-Thesis Option (36 hours)

Core Courses (18 hours)

- AERO 6120 - Aviation History **3 credit hours**
- AERO 6130 - Aviation Safety Management **3 credit hours**
- AERO 6150 - Aviation Industries **3 credit hours**
- AERO 6610 - Introduction to Aerospace Research **3 credit hours**
- AERO 6611 - Applied Statistics in Aerospace Research **3 credit hours**
- AERO 6441 - Applied Research Capstone Project **3 credit hours (3 credit hours required)**

Required Courses (12 hours)

- AERO 6170 - Scheduled Air Carrier Operations **3 credit hours**
- AERO 6190 - Airport Organizational Structures and Operational Activities **3 credit hours**
- AERO 6250 - Airport Policy and Planning **3 credit hours**
- AERO 6370 - Aviation Contracts and Leases **3 credit hours**

Electives (6 hours)

- AERO 6050 - Aerospace Internship I **3 credit hours**
- AERO 6220 - Environmental Policy **3 credit hours**
- AERO 6270 - Airport Design **3 credit hours**
- AERO 6330 - International Aviation Systems **3 credit hours**
- AERO 6350 - General Aviation **3 credit hours**

Program Notes

Candidate must

1. file a degree plan in the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which candidate intends to graduate.

Aeronautical Science, Aviation Safety and Security Management Concentration, M.S.

Paul Craig, Program Director

(615) 494-8637

Paul.Craig@mtsu.edu

The Department of Aerospace offers the Master of Science (M.S.) in Aeronautical Science with concentrations in Aviation Education, Aviation Management, and Aviation Safety and Security Management.

Please see the undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admission decisions are based on a holistic assessment of an applicant's credentials. Applicants must have graduated from an accredited four-year college or university with a minimum 3.00 GPA. Completion of the Graduate Record Exam (GRE), Miller Analogies Test (MAT), or Graduate Management Admissions Test (GMAT) with an acceptable score (typically in the 50th percentile for the test selected) is required. Three letters of recommendation from academic or professional acquaintances and a personal statement are also required. The personal statement should be approximately 400 words and should outline the student's academic interests, potential area(s) of research interest, and professional goals. Undergraduate transcripts must reflect 15 semester hours of aviation coursework. Applicants with undergraduate majors in fields other than aviation will be required to complete AERO 1010 and AERO 1020 during their first semester in the M.S. program and 9 additional hours of undergraduate aviation courses prior to the completion of 21 hours of graduate credit. Applicants holding Federal Aviation Administration certificates may receive credit for AERO 1010 and AERO 1020.

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

Applicant must

1. submit an application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit three letters of recommendation from professors or professionals that address the applicant's potential to successfully complete an M.S. program in Aviation Administration;
3. submit official scores on the Graduate Record Examination (GRE), Miller Analogies Test (MAT), or Graduate Management Admissions Test (GMAT).
4. submit official transcripts of all previous college work.
5. submit personal statement.

Degree Requirements

The Master of Science in Aeronautical Science with a concentration in Aviation Safety and Security Management requires completion of 36 semester hours. Candidates must select the thesis or non-thesis option.

Candidate must

1. successfully complete a written comprehensive examination (may be taken no more than twice) usually taken in the semester in which the candidate intends to graduate;
2. successfully complete a thesis or applied research capstone project.

Curriculum: Aeronautical Science, Aviation Safety and Security Management

Thesis Option (36 hours)

Core Courses (21 hours)

- AERO 6120 - Aviation History **3 credit hours**
- AERO 6130 - Aviation Safety Management **3 credit hours**
- AERO 6150 - Aviation Industries **3 credit hours**
- AERO 6610 - Introduction to Aerospace Research **3 credit hours**
- AERO 6611 - Applied Statistics in Aerospace Research **3 credit hours**
- AERO 6640 - Thesis Research **1 to 6 credit hours (6 credit hours required)**

Required Courses (12 hours)

- AERO 6310 - Introduction to Aviation Security **3 credit hours**
- AERO 6320 - Aviation Security II **3 credit hours**
- AERO 6420 - Aviation Safety Investigation **3 credit hours**
- AERO 6430 - Human Factors in Aviation **3 credit hours**

Electives (3 hours)

- AERO 6050 - Aerospace Internship I **3 credit hours**
- AERO 6170 - Scheduled Air Carrier Operations **3 credit hours**
- AERO 6220 - Environmental Policy **3 credit hours**
- AERO 6350 - General Aviation **3 credit hours**
- ET 6010 - Safety Planning **3 credit hours**
- ET 6020 - Safety Technology and Engineering **3 credit hours**
- ET 6070 - Anthropometric Factors in Accident Prevention **3 credit hours**
- INFS 6610 - Information Systems Management and Applications **3 credit hours** OR
- INFS 6720 - Knowledge Management **3 credit hours**

Non-Thesis Option (36 hours)

Core Courses (18 hours)

- AERO 6120 - Aviation History **3 credit hours**
- AERO 6130 - Aviation Safety Management **3 credit hours**
- AERO 6150 - Aviation Industries **3 credit hours**
- AERO 6610 - Introduction to Aerospace Research **3 credit hours**
- AERO 6611 - Applied Statistics in Aerospace Research **3 credit hours**
- AERO 6441 - Applied Research Capstone Project **3 credit hours (3 credit hours required)**

Required Courses (12 hours)

- AERO 6310 - Introduction to Aviation Security **3 credit hours**
- AERO 6320 - Aviation Security II **3 credit hours**
- AERO 6420 - Aviation Safety Investigation **3 credit hours**
- AERO 6430 - Human Factors in Aviation **3 credit hours**

Electives (6 hours)

- AERO 6050 - Aerospace Internship I **3 credit hours**
- AERO 6170 - Scheduled Air Carrier Operations **3 credit hours**
- AERO 6220 - Environmental Policy **3 credit hours**
- AERO 6350 - General Aviation **3 credit hours**
- ET 6010 - Safety Planning **3 credit hours**
- ET 6020 - Safety Technology and Engineering **3 credit hours**
- ET 6070 - Anthropometric Factors in Accident Prevention **3 credit hours**
- INFS 6610 - Information Systems Management and Applications **3 credit hours** OR
- INFS 6720 - Knowledge Management **3 credit hours**

Program Notes

Candidate must

1. file a degree plan in the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which candidate intends to graduate.

Aerospace Minor

There are two patterns of minors from which a candidate may choose:

1. A single minor consisting of at least 12 semester hours; 12 undergraduate hours in an area are prerequisite to a single minor in that area at the master's level.
2. A minor consisting of a minimum of 6 semester hours in each of two subjects. The candidate is expected to complete the total program in the major, minor, and/or cognate fields. A cognate is defined as 6 semester hours.

Aerospace

AERO 5400 - Space

3 credit hours

Extensive study of the history of space exploration, the successes and failures of manned and unmanned efforts, and what the future may be for human beings in space.

AERO 5490 - Aerospace Science for Teachers

3 credit hours

For teachers who desire an introduction to the aviation and space industry.

AERO 6050 - Aerospace Internship I

3 credit hours

Prerequisite: Consent of department chair. Student employed by an acceptable airline, airport, or aerospace manufacturer for field work. Minimum 300 hours work required. Pass/Fail.

AERO 6076 - Selected Readings in Aerospace

3 credit hours

Prerequisite: Graduate standing. Guided readings in aviation or space. Topics alternate each semester and range from historical events to possible future developments. Discussion, presentations, and critical analysis of material.

AERO 6100 - Aviation Education Workshop

3 credit hours

(Same as YOED 6100.) A fundamental course in aviation education offered through a grant from the Tennessee Department of Transportation (TDOT) to Tennessee educators; designed to provide K-12 educators aviation education classroom strategies and materials. Includes an aircraft flight and a field trip.

AERO 6120 - Aviation History

3 credit hours

Detailed examination of the development and role of aviation and its economic, social, and political impact on the modern world. Particular emphasis on the global aspects of civilian aviation and the consequences of the transportation revolution it engendered. Specific topics analyzed in detail each semester.

AERO 6130 - Aviation Safety Management

3 credit hours

An examination of the various programs which airport operators employ in operating and maintaining airport

safety and security services. Special emphasis on federal guidelines and their applications at commercial service airports.

AERO 6150 - Aviation Industries

3 credit hours

An overview of domestic and international air transportation businesses. Includes an analysis of extant and forecast labor requirements.

AERO 6170 - Scheduled Air Carrier Operations

3 credit hours

An examination of contemporary problems and issues confronting airline industry policy makers, government regulators, managers, and the traveling public.

AERO 6190 - Airport Organizational Structures and Operational Activities

3 credit hours

A critical analysis of airport organizational structures, functions, and constraints affecting the airport. A detailed view of operational activities and methods to improve airport efficiency.

AERO 6220 - Environmental Policy

3 credit hours

Airport planning and land use programs and procedures as they are currently used within the industry.

AERO 6250 - Airport Policy and Planning

3 credit hours

The regulatory agencies of the aviation industry and their functions. Special emphasis on current problems and issues affecting the industry.

AERO 6270 - Airport Design

3 credit hours

Introduces the concepts of airport planning, design, and layout with particular emphasis on community characteristics and resource allocation. Students will become familiar with the Federal Aviation Administration's role in the airport design process.

AERO 6310 - Introduction to Aviation Security

3 credit hours

An overview of the aviation security system in the United States, including airport, aircraft operator, and general aviation perspectives. History and development of aviation security along with the role of government in aviation security discussed.

AERO 6320 - Aviation Security II**3 credit hours**

Prerequisite: AERO 6310. Provides an in-depth analysis of aviation security including U.S. policy and strategy, passenger and baggage screening, in-flight security, and airport security.

AERO 6330 - International Aviation Systems**3 credit hours**

An in-depth analysis of international aviation with particular attention to U.S. aviation interface. Areas covered include the air traffic control systems, bilateral agreements, nationalized vs. privately owned carriers, ETOPS restrictions, marketing and operational difficulties, etc.

AERO 6350 - General Aviation**3 credit hours**

Operations, supervision, and the role of administration in the general aviation industry.

AERO 6370 - Aviation Contracts and Leases**3 credit hours**

An examination of the various agreements utilized by airports to define the terms and conditions for airlines, FBOs, concessionaires, air cargo operators, and other airport tenants. Analysis of the general provisions and requirements contained within airport leases and those specific to each tenant. A review of airport lease administration and compliance procedures.

AERO 6420 - Aviation Safety Investigation**3 credit hours**

Prerequisite: Graduate standing in Aerospace or permission of department. Acquaints students with skills and procedures used in aviation accident and incident investigation. Exposure to accident investigation management techniques, the information collection process, interviewing procedures, human factors, safety analysis, and investigation reporting. Emphasis placed on using safety investigation data to develop safety improvements.

AERO 6430 - Human Factors in Aviation**3 credit hours**

Prerequisite: Graduate standing in Aerospace or permission of department. Comprehensive look at how human physiology and psychology affect aviation operations. Emphasis placed on how these factors can lead to aviation accidents and the development of safety systems to mitigate human error.

AERO 6441 - Applied Research Capstone Project**3 credit hours**

Prerequisites: AERO 6610 and AERO 6611. Culminating experiences for M.S. in Aeronautical Science candidates desiring professional careers in the aviation industry (non-thesis option). Involves an independently designed investigation of contemporary issues within the aviation industry. Appropriate research methodologies as well as completion of a final project report and presentation required.

AERO 6450 - Airport Funding Policy**3 credit hours**

Airport subsidy funding by the local, state, and federal governments and their essential components as applied to local airports. Procedures necessary to obtain government funding and grants available for building new facilities and repairing existing buildings.

AERO 6540 - Topics in Aerospace Education**1 to 3 credit hours**

(Same as YOED 6540.) Content varies with needs of individual students who are interested in making a specialized study of current problems in the field of aerospace education.

AERO 6610 - Introduction to Aerospace Research**3 credit hours**

Emphasis on research as a significant component of graduate study to include methods, procedures, style, and form.

AERO 6611 - Applied Statistics in Aerospace Research**3 credit hours**

Prerequisite: AERO 6610 with minimum grade of C. Designed to integrate statistics and complement AERO 6610. Introduction to inferential statistics, including parametric and nonparametric, and descriptive statistics using specific examples from research in aerospace. Only statistics most commonly used in aerospace/aviation will be covered. General objective is to help students understand applied statistics; specific objective is to show students how to apply statistics specific for research designs used in aerospace/aviation.

AERO 6640 - Thesis Research**1 to 6 credit hours**

Prerequisite: AERO 6610. Selection of a research problem, review of pertinent literature, collection and analysis of data, and composition of thesis. Once enrolled, student should register for at least one credit

hour of master's research each semester until completion. S/U grading.

AERO 6700 - Advanced Aviation Education Workshop

3 credit hours

(Same as YOED 6700.) Prerequisite: AERO 6100.
(Same as YOED 6100.) Second course in aviation education offered through a grant from the Tennessee Department of Transportation (TDOT) to Tennessee educators; designed to provide K-12 educators aviation education classroom strategies and materials. Includes an aircraft cross-country flight and a field trip.

AERO 6999 - Comprehensive Examination and Preparation

1 credit hours

Open only to students who are not enrolled in any other graduate course and who will take the master's comprehensive examination during the term. The student must contact the graduate advisor during the first two weeks of the term for specifics regarding the details of this comprehensive examination preparatory course. Credit may not be applied to degree requirements.

Agribusiness and Agriscience

Jessica Carter, Director

(615) 898-2523

www.mtsu.edu/abas/

The School of Agribusiness and Agriscience offers the Master of Science (M.S.) in Horse Science with concentrations in Equine Education, Equine Physiology, and Industry Management and a minor in Agriculture.

Agriculture Minor

There are two patterns of minors from which a candidate may choose:

1. A single minor consisting of at least 12 semester hours; 12 undergraduate hours in an area are prerequisite to a single minor in that area at the master's level.
2. A minor consisting of a minimum of 6 semester hours in each of two subjects. The candidate is expected to complete the total program in the major, minor, and/or cognate fields. A cognate is defined as 6 semester hours.

Horse Science, Equine Education Concentration, M.S.

Holly Spooner, Program Director

(615) 494-8849

Holly.Spooner@mtsu.edu

The School of Agribusiness and Agriscience offers the Master of Science (M.S.) in Horse Science, designed to prepare graduates for the multifaceted equine industry. Students may choose one of three concentrations: Equine Education, Equine Physiology, or Industry Management.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admissions are based on a comprehensive assessment of a candidate's qualifications including Graduate Record Examination (GRE) scores or scores on the Miller Analogies Test (MAT), undergraduate and graduate grade point average, letters of recommendation, and a personal interview.

Applicants who do not meet admission requirements but whose overall record indicates the potential for success may be considered for conditional admission. Students admitted conditionally must meet all conditions established by the Horse Science Graduate Committee in order to remain in the program.

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

The application deadline is April 15 for those wishing to be considered for graduate assistantships and admission in the Summer or Fall. October 1 is the application deadline for admission in the Spring. Applications will be accepted after these dates, but admission consideration is not guaranteed.

Applicant must

1. submit an application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit three letters of recommendation from professors or professionals that address the applicant's potential to successfully complete an M.S. program in Horse Science;
3. submit official scores on the Graduate Record Examination (GRE) or Miller Analogies Test (MAT). Successful applicants typically have GRE Verbal and Quantitative scores exceeding 146 and 140 respectively (current scale) or 400 each (former scale), with a total combined score that exceeds 286 (current scale) or 800 (former scale) or a score above 385 on the MAT;
4. submit official transcripts of previous college work reflecting a 3.00 GPA from a minimum of 12 credit hours of upper-division, undergraduate animal science and/or equine science courses or equivalent industry experience as approved by the Horse Science Graduate Committee;
5. submit a letter of intent that addresses the following:
 - a. In 500 words or less, applicant should describe his/her horse experience to date (which may include but is not limited to college coursework, club/team involvement, breed/discipline groups, etc.) as well as other experiences which may have impacted the decision to pursue this degree; and
 - b. In 500 words or less, applicant should describe future plans and goals as they relate to obtaining an M.S. in Horse Science degree;
6. after application review, participate in an invited interview with the Horse Science Graduate Committee at the applicant's expense before final acceptance into the program.

Degree Requirements

The Master of Science in Horse Science with a concentration in Equine Education requires completion of a 15-credit-hour core and 21 credit hours in a concentration.

Candidate must

1. successfully complete a written comprehensive examination (may be taken no more than twice) during the semester in which the candidate intends to graduate;
2. successfully complete and defend a thesis or equine experiential learning project; students have the option to conduct and complete a traditional research-based thesis project or to select a more contemporary non-thesis option.

All students in the graduate program will be expected to complete a minimum of two consecutive semesters of full-time study in residence at MTSU.

Curriculum: Horse Science, Equine Education

The Equine Education concentration offers a skill set needed to teach and provide instruction at a postsecondary equine program or leadership within the Cooperative Extension Service. Students in the Equine Education concentration have the option to conduct and complete a traditional, research-based thesis project or to select a more contemporary non-thesis option.

Candidate must complete 36 hours in the following course of study:

Core Courses (15 hours)

- ANSC 5420 - Animal Breeding and Genetics **3 credit hours**
- ABAS 6000 - Research Methods in Agricultural Science **3 credit hours**
- ABAS 6100 - Graduate Seminar in Agriculture **1 credit hours**
- HORS 6170 - Issues in the Equine Industry **2 credit hours**
- HORS 6440 - Advanced Equine Nutrition **3 credit hours**
- STAT 6020 - Introduction to Biostatistics **3 credit hours**

Required Courses (12 hours)

- HORS 6250 - Coaching and Teaching for Equine Competition **3 credit hours**
- LSM 6500 - Legal Issues and Risk Management in Sport and Leisure Services **3 credit hours**
- LSM 6730 - Socio-Cultural and Ethical Issues in Leisure and Sport **3 credit hours**
- HORS 6540 - Equine Experiential Learning **1 to 6 credit hours** (3 credit hours minimum) OR
- ABAS 6640 - Thesis Research **1 to 6 credit hours** (3 credit hours minimum)

Electives (9 hours)

In consultation with their committees, students must select a minimum 9 hours from graduate-level courses within the College of Basic and Applied Sciences, the College of Behavioral and Health Sciences, and/or the Jones College of Business. Of these, a minimum of 6 hours must be taken from courses with similar content rubrics (i.e., MKT, MGMT, LSM, ABAS, etc.). Students are limited to 3 hours at the 5000 level.

Program Notes

Candidate must

1. file a degree plan in the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which candidate intends to graduate.

Horse Science, Equine Physiology Concentration, M.S.

Holly Spooner, Program Director

(615) 494-8849

Holly.Spooner@mtsu.edu

The School of Agribusiness and Agriscience offers the Master of Science (M.S.) in Horse Science, designed to prepare graduates for the multifaceted equine industry. Students may choose one of three concentrations: Equine Education, Equine Physiology, or Industry Management.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admissions are based on a comprehensive assessment of a candidate's qualifications including Graduate Record Examination (GRE) scores or scores on the Miller Analogies Test (MAT), undergraduate and graduate grade point average, letters of recommendation, and a personal interview.

Applicants who do not meet admission requirements but whose overall record indicates the potential for success may be considered for conditional admission. Students admitted conditionally must meet all conditions established by the Horse Science Graduate Committee in order to remain in the program.

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

The application deadline is April 15 for those wishing to be considered for graduate assistantships and admission in the Summer or Fall. October 1 is the application deadline for admission in the Spring. Applications will be accepted after these dates, but admission consideration is not guaranteed.

Applicant must

1. submit an application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit three letters of recommendation from professors or professionals that address the applicant's potential to successfully complete an M.S. program in Horse Science;
3. submit official scores on the Graduate Record Examination (GRE) or Miller Analogies Test (MAT). Successful applicants typically have GRE Verbal and Quantitative scores exceeding 146 and 140 respectively (current scale) or 400 each (former scale), with a total combined score that exceeds 286 (current scale) or 800 (former scale) or a score above 385 on the MAT;
4. submit official transcripts of previous college work reflecting a 3.00 GPA from a minimum of 12 credit hours of upper-division, undergraduate animal science and/or equine science courses or equivalent industry experience as approved by the Horse Science Graduate Committee;
5. submit a letter of intent that addresses the following:
 - a. In 500 words or less, applicant should describe his/her horse experience to date (which may include but is not limited to college coursework, club/team involvement, breed/discipline groups, etc.) as well as other experiences which may have impacted the decision to pursue this degree; and
 - b. In 500 words or less, applicant should describe future plans and goals as they relate to obtaining an M.S. in Horse Science degree;
6. after application review, participate in an invited interview with the Horse Science Graduate Committee at the applicant's expense before final acceptance into the program.

Degree Requirements

The Master of Science in Horse Science with a concentration in Equine Physiology requires completion of a 15-credit-hour core and 21 credit hours in a concentration.

Candidate must

1. successfully complete a written comprehensive examination (may be taken no more than twice) during the semester in which the candidate intends to graduate;
2. successfully complete and defend a thesis project;
3. all students in the graduate program will be expected to complete a minimum of two consecutive semesters of full-time study in residence at MTSU.

Curriculum: Horse Science, Equine Physiology

The Equine Physiology concentration emphasizes an interdisciplinary, science-based curriculum structured to build knowledge of scientific principles and apply them to a thesis research project related to equine science.

Candidate must complete 36 hours in the following course of study:

Core Courses (15 hours)

- ANSC 5420 - Animal Breeding and Genetics **3 credit hours**
- ABAS 6000 - Research Methods in Agricultural Science **3 credit hours**
- ABAS 6100 - Graduate Seminar in Agriculture **1 credit hours**
- HORS 6170 - Issues in the Equine Industry **2 credit hours**
- HORS 6440 - Advanced Equine Nutrition **3 credit hours**
- STAT 6020 - Introduction to Biostatistics **3 credit hours**

Required Courses (21 hours)

- HORS 6090 - Equine Reproductive Physiology **3 credit hours**
- ABAS 6640 - Thesis Research **1 to 6 credit hours** (3 credit hours minimum)
- Electives to be selected in consultation with the advisor (**6 credit hours**)
- BIOL 5170 - Endocrinology **3 credit hours**
- CHEM 6500 - Biochemistry I **3 credit hours**
- STAT 6602 - Problems in Statistics-Regression Analysis **3 credit hours** OR
- STAT 6603 - Problems in Statistics-Nonparametric Statistics **3 credit hours** OR
- STAT 6604 - Problems in Statistics-Experimental Design **3 credit hours** OR
- STAT 6605 - Problems in Statistics-SAS Programming **1 to 9 credit hours**

Program Notes

Candidate must

1. file a degree plan in the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which candidate intends to graduate.

Horse Science, Industry Management Concentration, M.S.

Holly Spooner, Program Director

(615) 494-8849

Holly.Spooner@mtsu.edu

The School of Agribusiness and Agriscience offers the Master of Science (M.S.) in Horse Science, designed to prepare graduates for the multifaceted equine industry. Students may choose one of three concentrations: Equine Education, Equine Physiology, or Industry Management.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admissions are based on a comprehensive assessment of a candidate's qualifications including Graduate Record Examination (GRE) scores or scores on the Miller Analogies Test (MAT), undergraduate and graduate grade point average, letters of recommendation, and a personal interview.

Applicants who do not meet admission requirements but whose overall record indicates the potential for success may be considered for conditional admission. Students admitted conditionally must meet all conditions established by the Horse Science Graduate Committee in order to remain in the program.

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

The application deadline is April 15 for those wishing to be considered for graduate assistantships and admission in the Summer or Fall. October 1 is the application deadline for admission in the Spring. Applications will be accepted after these dates, but admission consideration is not guaranteed.

Applicant must

1. submit an application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit three letters of recommendation from professors or professionals that address the applicant's potential to successfully complete an M.S. program in Horse Science;
3. submit official scores on the Graduate Record Examination (GRE) or Miller Analogies Test (MAT). Successful applicants typically have GRE Verbal and Quantitative scores exceeding 146 and 140 respectively (current scale) or 400 each (former scale), with a total combined score that exceeds 286 (current scale) or 800 (former scale) or a score above 385 on the MAT;
4. submit official transcripts of previous college work reflecting a 3.00 GPA from a minimum of 12 credit hours of upper-division, undergraduate animal science and/or equine science courses or equivalent industry experience as approved by the Horse Science Graduate Committee;
5. submit a letter of intent that addresses the following:
 - a. In 500 words or less, applicant should describe his/her horse experience to date (which may include but is not limited to college coursework, club/team involvement, breed/discipline groups, etc.) as well as other experiences which may have impacted the decision to pursue this degree; and
 - b. In 500 words or less, applicant should describe future plans and goals as they relate to obtaining an M.S. in Horse Science degree;
6. after application review, participate in an invited interview with the Horse Science Graduate Committee at the applicant's expense before final acceptance into the program.

Degree Requirements

The Master of Science in Horse Science with a concentration in Industry Management requires completion of a 15-credit-hour core and 21 credit hours in a concentration.

Candidate must

1. successfully complete a written comprehensive examination (may be taken no more than twice) during the semester in which the candidate intends to graduate;
2. successfully complete and defend a thesis project OR equine experiential learning project.

All students in the graduate program will be expected to complete a minimum of two consecutive semesters of full-time study in residence at MTSU.

Curriculum: Horse Science, Industry Management

The curriculum is structured for a specific industry-related career in the Industry Management concentration. Students have the option to conduct and complete a traditional, research-based thesis project or to select a more contemporary non-thesis option.

Candidate must complete 36 hours in the following course of study:

Core Courses (15 hours)

- ANSC 5420 - Animal Breeding and Genetics **3 credit hours**
- ABAS 6000 - Research Methods in Agricultural Science **3 credit hours**
- ABAS 6100 - Graduate Seminar in Agriculture **1 credit hours**
- HORS 6170 - Issues in the Equine Industry **2 credit hours**
- HORS 6440 - Advanced Equine Nutrition **3 credit hours**
- STAT 6020 - Introduction to Biostatistics **3 credit hours**

Required Courses (12 hours)

- HORS 6040 - Management of Equine Events and Facilities **3 credit hours**
- HORS 6540 - Equine Experiential Learning **1 to 6 credit hours (3 credit hours minimum)** OR
- ABAS 6640 - Thesis Research **1 to 6 credit hours (3 credit hours minimum)**

Choose two of the following:

- LSM 6520 - Management Practices in Recreation and Leisure Services **3 credit hours**
- MGMT 6100 - Strategic Decision Making **3 credit hours**
- MGMT 6300 - Not-for-Profit Management and Governance **3 credit hours**
- MGMT 6740 - Leadership and Motivation **3 credit hours**
- MKT 6810 - Promotional Strategy **3 credit hours**
- MKT 6870 - Techniques in Social Media, Search Engine and Internet Marketing **3 credit hours**
- MKT 6880 - Sport and Entertainment Marketing **3 credit hours**

Electives (9 hours)

In consultation with their committees, students must select a minimum of 9 hours from graduate-level courses in the College of Basic and Applied Sciences, the College of Education, and/or the Jones College of Business. Of these, a minimum of 6 hours must be taken from courses with similar content rubrics (i.e., MKT, MGMT, LSM, ABAS, etc.). Students may take a maximum of 12 hours of electives selected from the MGMT, MKT, and or MC rubrics. Students are limited to 6 hours at the 5000 level.

Program Notes

Candidate must

1. file a degree plan in the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which candidate intends to graduate.

Agribusiness

AGBS 5130 - Agricultural Marketing and Price Analysis

3 credit hours

Prerequisite: ABAS/AGBS 3130 or approval of instructor. Agricultural prices and their relationship to production and marketing. Agricultural marketing systems, functions, institutions, and structural changes.

AGBS 5140 - Economics of Agribusiness Management

3 credit hours

Prerequisite: ABAS/AGBS 3130 or approval of instructor. The application of economic concepts to agribusiness firms.

AGBS 5150 - Agricultural Policy

3 credit hours

Prerequisite: ABAS/AGBS 3130 or approval of instructor. Agricultural policy in a democratic society; relationship of farm groups to public policy; types of agricultural programs and appraisal of their results.

AGBS 5200 - Fruit and Vegetable Marketing

3 credit hours

Prerequisites: PSCI 1030/1031 and BIOL 1030/1031 or approval of instructor. Basic biochemistry of respiration, handling techniques and practices, quality assessment, and marketing of fruit and vegetable crops. Both domestic and international marketing of fruit and vegetable products discussed. Examines economic impact of improper handling on both the local producer and the end user.

AGBS 5830 - Food Quality Control

3 credit hours

Prerequisites: PSCI 1030/1031 and BIOL 1030/1031 or approval of instructor. Quality control and sensory evaluation techniques utilized in food processing. Instrumental and physical methods of quality determination of raw and processed food products, hazard analysis and critical control point (HACCP), and quality philosophies employed in the industry. Sensory evaluation techniques and statistical analysis of evaluation results covered.

Agribusiness and Agriscience

ABAS 5100 - Microcomputer Applications in Agriculture

3 credit hours

Prerequisite: CSCI 1150 or INFS 2200. Includes use of agricultural software, agricultural communications network, computer daily feeding machines, and farm records.

ABAS 5700 - Agriculture in Our Lives

3 credit hours

The national and international importance of U.S. agriculture. Emphasis on food production and marketing, land conservation, and agriculture related recreation. Accepted as a natural science elective for education majors. NO CREDIT GIVEN TOWARD A MAJOR IN THE SCHOOL OF AGRIBUSINESS AND AGRISCIENCE.

ABAS 5990 - Seminar

1 credit hours

Students required to research and make an oral report on a current agricultural topic.

ABAS 6000 - Research Methods in Agricultural Science

3 credit hours

A review of current scientific methods related to experiments in agriculture. Topics include research ethics, welfare of research subjects, literature resources, critical review of scientific literature, experimental design, scientific writing, interpreting data, and data presentation.

ABAS 6100 - Graduate Seminar in Agriculture

1 credit hours

Seminar presentations target current issues and research advances in agricultural science and production. Presenters include faculty, graduate students, and outside speakers. Active participation in topic discussions emphasized. May be repeated. S/U grading.

ABAS 6450 - Problems in Agriscience Technologies

3 credit hours

Prerequisite: Teaching experience or approval of instructor. Provides agricultural education teachers with intensive training advanced technologies. A MAXIMUM OF SIX CREDIT HOURS IN EACH DIVISION.

**ABAS 6451 - Problems in Agriscience
Technology-Animal Science
3 credit hours**

Prerequisite: Teaching experience or approval of instructor. Provides agricultural education teachers with intensive training in advanced technologies. A MAXIMUM OF SIX CREDIT HOURS IN EACH DIVISION. Animal Science.

**ABAS 6452 - Problems in Agriscience
Technologies-Plant Science
3 credit hours**

Prerequisite: Teaching experience or approval of instructor. Provides agricultural education teachers with intensive training in advanced technologies. A MAXIMUM OF SIX CREDIT HOURS IN EACH DIVISION. Plant Science.

**ABAS 6453 - Problems in Agriscience
Technologies-Agricultural Mechanics
3 credit hours**

Prerequisite: Teaching experience or approval of instructor. Provides agricultural education teachers with intensive training in advanced technologies. A MAXIMUM OF SIX CREDIT HOURS IN EACH DIVISION. Agricultural Mechanics.

**ABAS 6454 - Problems in Agriscience
Technologies-Agribusiness
3 credit hours**

Prerequisite: Teaching experience or approval of instructor. Provides agricultural education teachers with intensive training in advanced technologies. A MAXIMUM OF SIX CREDIT HOURS IN EACH DIVISION. Agribusiness.

**ABAS 6455 - Problems in Agriscience
Technologies-Forestry and Agricultural Products
3 credit hours**

Prerequisite: Teaching experience or approval of instructor. Provides agricultural education teachers with intensive training in advanced technologies. A MAXIMUM OF SIX CREDIT HOURS IN EACH DIVISION. Forestry and Agricultural Products.

**ABAS 6640 - Thesis Research
1 to 6 credit hours**

Prerequisite: Completion of 24 hours of graduate-level course work. The completion of selected research problem, review of pertinent literature, collection and analysis of data, and preparation of the thesis. S/U grading.

**ABAS 6910 - Problems in Agriculture
1 to 6 credit hours**

Problem or problems selected from one of the major disciplines. May involve conferences with instructor, library work, field study, and/or laboratory activity. Students can take from one to three credits with a maximum of three per semester.

Agricultural Education

**AGED 5210 - Farm Power and Equipment
3 credit hours**

Gasoline engines with actual work experience in overhaul. Work also with transmissions, hydraulics, braking systems, and other farm equipment including use of shop manuals, operation manuals, and parts books.

**AGED 5220 - Methods of Teaching Agriscience
and Agricultural Mechanics
3 credit hours**

Emphasis on performing shop skills such as welding, brazing, electrical wiring, etc.

**AGED 5230 - Adult Education in Vocational-
Education and Program Development
3 credit hours**

How to teach adults and administer adult programs. Emphasis on planning, organizing, and arranging courses for adults in agriculture.

**AGED 6010 - History and Philosophy of
Agricultural Education
3 credit hours**

Explores the nature and history of selected philosophical concepts and philosophers and evaluates their influence upon education and agricultural education in the United States.

**AGED 6020 - Principles of Agricultural Leadership
3 credit hours**

Identifies and defines leadership, as well as identifies styles and roles of leadership. Explores development techniques and skills required in working in and with organizations through reading, observing, applying, creating, and evaluating leadership.

**AGED 6030 - Theoretical Foundations of Personal
Agricultural Leadership
3 credit hours**

Introduces theories of teaching and learning and related research. Explores trait, behavioral skills, situational approach, path-goal theory, leader-

member theory, and other leadership theories. Explores applications of teaching and learning theory in the context of teaching agricultural subject matter.

AGED 6050 - Leadership Development in Agricultural Organizations

3 credit hours

Examines leadership as it related to organizations and their group and team behavior. Identifies styles and roles of leadership, development of leadership techniques and skills required in working in organizations and youth groups, methods of resolving conflict, communicating, guiding and evaluating leadership, and ethical consideration of leaders. Capstone course for the Agricultural Education Leadership concentration.

Animal Science

ANSC 5260 - Behavior of Domestic Animals

3 credit hours

Behavior aspects of raising and managing domestic animals to include equine, swine, goats, cattle, sheep, dogs, and cats. Communicative, ingestive, sexual, social, aggressive, and abnormal behaviors emphasized.

ANSC 5410 - Animal Nutrition and Feeding

3 credit hours

Prerequisite: ABAS/ANSC 1410. Gastrointestinal tract, process of digestion, and nutrient utilization. Application of principles of animal nutrition to formulation of supplements and complete rations for livestock.

ANSC 5420 - Animal Breeding and Genetics

3 credit hours

Basic principles of genetics, heredity, crossbreeding, inbreeding, and molecular genetics. Animal breeding topics include quantitative traits, prediction of breeding value, methods of selection, and genetic evaluations including genomic-enhanced selection.

Offered fall only.

ANSC 5470 - Advanced Beef Production

3 credit hours

Prerequisite: ABAS/ANSC 3470 or approval of instructor. In-depth look at various systems of beef production from standpoint of function, economics, and suitability to locale. Extensive field trips to commercial cow-calf, feedlot, performance testing, stocker, and purebred operations.

ANSC 5510 - Domestic Animal Reproductive Physiology

3 credit hours

Advanced topics in the anatomy, physiology, and endocrinology of reproduction in domestic livestock species. Topics include male and female physiology and an overview of comparative anatomy and physiology between species. Current technologies and methods in controlling reproduction in livestock species also discussed.

Horse Science

HORS 5400 - Horsemanship-Equitation

3 credit hours

Prerequisite: ABAS/HORS 2400 or approval of instructor. Understanding, recognizing, and producing lateral control in the horse. Lateral exercises; lateral movements; developing lateral balance and control, track, gait, pace, impulsion, and rhythm. Two-hour lecture and two-hour laboratory each week.

HORS 5430 - Horse Production

3 credit hours

Prerequisites: HORS 2400, 3040, and one of the following: HORS 3300, 4090, or 4440 or consent of instructor. Scientific principles relevant to production requirements of horses as related to exercise physiology and performance, growth, reproductive physiology and state, age, and clinical support. Facilities management, marketing, legal aspects of horse ownership and career opportunities covered.

HORS 5460 - Behavior and Training of Horses

3 credit hours

Prerequisites: ABAS 2400, 3400, and 4400 or approval of instructor. Theory, fundamentals, and practices of breaking, training, fitting, showing, and the use of light horses for riding and driving, with special emphasis on the Tennessee Walking Horse and the needs of the local area.

HORS 5980 - Seminar in Horse Science

1 credit hours

Familiarizes horse science majors with important current scientific investigation in horse science.

HORS 6040 - Management of Equine Events and Facilities

3 credit hours

Prerequisite: 12 hours of upper-division HORS courses. Fundamentals of managing equine and other livestock events and facilities. Emphasis placed on

active participation in management of equine events held at MTSU facilities.

HORS 6090 - Equine Reproductive Physiology
3 credit hours

Prerequisite: Undergraduate animal reproduction course or permission of instructor. Principles of equine reproductive physiology related to management of the stallion, mare, and foal. Topics covered include reproductive anatomy, endocrine regulation of reproduction, molecular mechanisms of hormone action, manipulation of reproductive function, and understanding and implementation of assisted reproductive technology in breeding farm management. Two hours lecture and two-hour laboratory.

HORS 6170 - Issues in the Equine Industry
2 credit hours

In-depth look at relevant events affecting the equine industry. Interaction with industry leaders provides a unique window to examine the issues affecting the horse industry. Oral and written reports on specific problems presented. Topics will vary depending upon the current issues important to the equine industry.

HORS 6250 - Coaching and Teaching for Equine Competition
3 credit hours

Teaching and coaching successful teams for college or youth equestrian and judging competitions. Utilizes current philosophies of teaching and coaching based on fundamental psychology of personalities and learning. Practice and assisting with teaching and coaching of youth and college teams will be required.

HORS 6440 - Advanced Equine Nutrition
3 credit hours

A class in organic chemistry or biochemistry recommended. A biochemical approach to understanding the nutritional requirements for horses at various life stages, including maintenance, growth, reproduction, performance, age, and clinical support. Feeding management related to nutrient digestion, absorption, and metabolism. Current equine nutrition research and its applications to practical equine management emphasized.

HORS 6540 - Equine Experiential Learning
1 to 6 credit hours

Prerequisite: Completion of 24 semester hours at the master's level. Practical experience gained while working with an equine-related program emphasizing

hands-on involvement. Students will develop, implement, and conclude an applied project in consultation with a faculty member and approved by their committee. S/U grading.

HORS 6550 - Advanced Equine Exercise Physiology
3 credit hours

Prerequisite: HORS 4550. Review and evaluation of current research in equine exercise science; physiologic, metabolic, and mental adaptation to athletic training; bioenergetics of muscle metabolism; nutrition of performance horses; management and training approaches to improve performance and delay fatigue in equine athletes.

Plant and Soil Science

PLSO 5310 - Forage Crops
3 credit hours

Adaptation, distribution, establishment, management, cultivation, and utilization of forage legumes and grasses.

PLSO 5330 - Turf Management
3 credit hours

Prerequisite: ABAS/PLSO 1610 or BIOL 1120/1121. Establishment and management of turf grasses for lawns, golf courses, and parks.

PLSO 5340 - Soil Formation and Remediation
3 credit hours

Prerequisite: ABAS/PLSO 3340. Environmental factors affecting soil formation and utilization.

PLSO 5350 - Soil Survey and Land Use
3 credit hours

Prerequisite: ABAS/PLSO 3340 or approval of instructor. Soil properties used to determine suitability for land use. Lecture/lab.

PLSO 5620 - Greenhouse Management
3 credit hours

Prerequisite: ABAS/PLSO 1610 or BIOL 1120/1121. Analysis of soils, fertilizers, irrigation techniques, container preparation, ventilation, growth regulation, and carbon dioxide enrichment for greenhouse operation. Two hours lecture and one two-hour lab.

PLSO 5630 - Floriculture
3 credit hours

Prerequisite: ABAS/PLSO 1610 or BIOL 1120/1121.

Propagation and other cultural practices for the production and maintenance of plants and flowers in the home. Two hours lecture and one two-hour lab.

PLSO 5640 - Landscaping
3 credit hours

Application of the principles of design, the use of proportionate-sized woody landscape plants, and other practices to produce low-maintenance-cost landscapes. One hour lecture and one four-hour lab.

PLSO 5670 - Plant Propagation

3 credit hours

Prerequisite: ABAS/PLSO 1610 or BIOL 1120/1121.

Anatomical features and physiological principles involved in propagating plants from seed and by division, cutting, budding, and grafting. Use of growth regulators and environmental factors. Two hours lecture and one two-hour lab.

Biology

Lynn Boyd, Chair

(615) 898-2847

www.mtsu.edu/biology/

The Department of Biology offers the Master of Science as well as a minor at the graduate level. The department offers courses in three interdisciplinary Ph.D. programs: Molecular Biosciences, Computational Sciences, and Mathematics and Science Education. The department also offers courses in the Master of Science in Professional Science.

Biology Minor

There are two patterns of minors from which a candidate may choose:

1. A single minor consisting of at least 12 semester hours; 12 undergraduate hours in an area are prerequisite to a single minor in that area at the master's level.
2. A minor consisting of a minimum of 6 semester hours in each of two subjects. The candidate is expected to complete the total program in the major, minor, and/or cognate fields. A cognate is defined as 6 semester hours.

Biology, M.S.

Dr. Vincent Cobb, Program Director
(615) 898-2045
Vincent.Cobb@mtsu.edu

Dr. Chris Herlihy
(615) 898-2611
Chris.Herlihy@mtsu.edu

The Department of Biology offers the Master of Science in Biology.
Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Required application materials include official transcripts, Graduate Record Examination (GRE) scores, three letters of recommendation, and a personal statement.

Students receiving unconditional admission typically will have a 3.40 overall (and in biology coursework) undergraduate grade point average and overall GRE scores above the fiftieth percentile.

All students in the graduate program must have an undergraduate minor (19 hours) in biology or its equivalent and 12 hours of chemistry (including one semester of organic chemistry or biochemistry).

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

Applications for admission are accepted year-round; preference for admission will be given to students adhering to the following deadlines: Summer/Fall enrollment, March 1; Spring enrollment, October 1.

Applicant must

1. submit an application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit official scores on the Graduate Record Examination (GRE);
3. submit official transcripts of previous college work;
4. submit three letters of recommendation from professors or professionals that address the applicant's potential to successfully complete an M.S. in Biology;
5. submit a personal statement. The personal statement should outline the student's interest in graduate study and indicate a potential area of research interest and thesis advisor.

Degree Requirements

The Master of Science in Biology requires completion of a minimum of 30 semester hours including at least 21 hours at the 6000 level.

Candidate must

1. successfully complete both written and oral comprehensive examinations (may be taken no more than twice) the semester before graduation;
2. present and successfully defend the thesis in a public forum;
3. complete 6 semester hours of approved research tools or two semesters (6 hours) of a foreign language in addition to the 30 hours;
4. complete BIOL 6620 Biological Research and submit a Research and Thesis Approval Form and a copy of the research proposal to the graduate program director before the end of the second semester of study.

Curriculum: Biology

Candidate must complete 30 hours with at least 21 hours at the 6000 level in the following course of study:

Major Courses (16 hours)

Required Courses (9 hours)

- BIOL 6620 - Biological Research **3 credit hours**
- BIOL 6640 - Thesis Research **1 to 6 credit hours**
- BIOL 6650 - Seminar **1 credit hours**
- BIOL 6660 - Seminar **2 credit hours**

NOTE: Students are expected to complete both seminars during the first year of graduate study.

Additional Major Courses (7 hours)

Must be selected from BIOL courses in consultation with graduate advisor.

Remaining Courses (14 hours)

- Additional courses to meet the 30-hour requirement may include approved graduate courses in biology, chemistry, mathematics, physics, or other related disciplines.
- A minor is optional, but if elected, must include a minimum of 12 semester hours (these 12 hours may be included in the 30 total required hours).

Program Notes

Candidate must

1. file a degree plan in the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which candidate intends to graduate.

Biology

BIOL 5040 - General Entomology **3 credit hours**

Prerequisites: BIOL 1110 /1111 and 1120/1121.
Structure, classification, evolution, importance, and life history of insects. Five hours lecture/laboratory.

BIOL 5050 - Parasitology **3 credit hours**

Prerequisites: BIOL 1110/1111 and 1120/1121.
Corequisite: BIOL 5051. Life histories, host-parasite relationships, and control measures of the more common parasites of humans and domesticated animals. Two lectures and one three-hour laboratory.

BIOL 5051 - Parasitology Lab **0 credit hours**

Corequisite: BIOL 5050.

BIOL 5130 - Histology **4 credit hours**

Prerequisites: BIOL 3250/3251; CHEM 2030/2031 or 3010/3011. Corequisite: BIOL 5131. Microscopic anatomy of vertebrate cells, tissues, and organs. Three lectures and one three-hour laboratory.

BIOL 5131 - Histology Lab **0 credit hours**

Corequisite: BIOL 5130.

BIOL 5140 - Invertebrate Zoology **4 credit hours**

Prerequisites: BIOL 1110/1111 and 1120/1121.
Corequisite: BIOL 5141. Structure, functions, life histories, and economic importance of the invertebrate phyla. Laboratory work comprises detailed studies of representative specimens. Three lectures and one three-hour laboratory.

BIOL 5141 - Invertebrate Zoology Lab **0 credit hours**

Corequisite: BIOL 5140.

BIOL 5170 - Endocrinology **3 credit hours**

Prerequisites: BIOL 3250/3251, 4110/4111, or 2020/2021; CHEM 2030/2031 or 3010/3011.
Structure, function, and integrative mechanisms of vertebrate endocrine organs, with additional attention to invertebrate hormones. Three lectures.

BIOL 5180 - Vertebrate Zoology **4 credit hours**

Prerequisites: BIOL 1110/1111 and 1120/1121.
Corequisite: BIOL 5181. Structure, life history, and classification of fish, amphibians, reptiles, birds, and mammals. Local representatives emphasized. Three lectures and one three-hour laboratory.

BIOL 5181 - Vertebrate Zoology Lab **0 credit hours**

Corequisite: BIOL 5180.

BIOL 5220 - Ichthyology **4 credit hours**

Prerequisites: BIOL 1110/1111 and 1120/1121.
Corequisite: BIOL 5221. The morphology, physiology, taxonomy, and ecology of fishes. Three lectures and one three-hour laboratory.

BIOL 5221 - Ichthyology Lab **0 credit hours**

Corequisite: BIOL 5220.

BIOL 5260 - Nature Study **3 credit hours**

Prerequisites: BIOL 1110/1111 and 1120/1121.
Identification of local plants and animals and a consideration of the ecological principles governing them. Four hours lecture/laboratory.

BIOL 5320 - Seminar: Advancements in Biology **2 credit hours**

A broad overview of biological principles and recent research developments. Two lectures.

BIOL 5330 - Biome Analysis **1 to 4 credit hours**

Prerequisite: Permission of department. An intensive classroom and on-site study of a specific biome with special emphasis on data collection and analysis. Consult department head for specific credits and costs.

BIOL 5390 - Ethology **4 credit hours**

Prerequisite: BIOL 1110/1111. Corequisite: BIOL 5391. Innate and learned animal behavior in primitive and advanced animals including behavior associated with space, reproduction, and food getting. Three lectures and one three-hour laboratory.

BIOL 5391 - Ethology Lab**0 credit hours**

Corequisite: BIOL 5390.

BIOL 5420 - Advanced Plant Ecology and Evolution**4 credit hours**

Prerequisites: BIOL 1110/BIOL 1111, BIOL 1120/BIOL 1121, and BIOL 3250/BIOL 3251 (or permission of department). Major themes in the ecology and evolution of plants. Topics include how plants sense, respond, and adapt to their environment; life history; species; and patterns of diversity and abundance of plants. Three hours lecture and one three-hour laboratory.

BIOL 5460 - Human Genetics**3 credit hours**

Prerequisite: BIOL 3250/3251. Corequisite: BIOL 5461. Application of the fundamental laws of inheritance to humans. Two lectures and one two-hour laboratory.

BIOL 5461 - Human Genetics Lab**0 credit hours**

Corequisite: BIOL 5460.

BIOL 5500 - Plant Physiology**4 credit hours**

Prerequisites: BIOL 3250/3251; CHEM 2030/2031 or 3010/3011. Plant growth; development and metabolism at the cellular and whole plant levels. Six hours lecture/laboratory.

BIOL 5510 - Food and Industrial Microbiology**4 credit hours**

Prerequisite: BIOL 2230/2231. Corequisite: BIOL 5511. Interaction between microorganisms and food; industrial processes of human importance. Three hours lecture and two 1.5 hour laboratory meetings per week.

BIOL 5511 - Food and Industrial Microbiology Lab**0 credit hours**

Corequisite: BIOL 5510

BIOL 5520 - Plant Anatomy**4 credit hours**

Prerequisite: BIOL 1120/1121. Plant cells, tissues, and organs. Emphasis on the survival value of the plant's various structural features. Six hours lecture/laboratory.

BIOL 5540 - Topics in Environmental Education**1 to 4 credit hours**

Prerequisite: Junior standing or above. An intensive classroom and field study of natural science and resources in Tennessee. Special emphasis on data collection, analysis, and problem solving. Target groups are graduate students and upper-division undergraduates in the areas of biology and education. Consult the department chair for specific credits and costs. This course will not apply to the biology major or minor.

BIOL 5550 - Biotechnology**3 credit hours**

Prerequisites: BIOL 2230/2231 and senior/graduate level. Instruction in both theory and application of current research methodologies in biology and molecular biology. Topics include immunochemistry, polymerase chain reaction, restriction enzyme analysis, and electrophoresis. Five hours lecture/laboratory.

BIOL 5560 - Neurobiology**4 credit hours**

Prerequisites: BIOL 1110/1111 and 1120/1121. Corequisite: BIOL 5561. Introduces comparative neurobiology. Topics include the basic structure and function of the nerve cell and organization of nervous systems of representative species of invertebrate and vertebrate animals. Three hours lecture and one three-hour laboratory.

BIOL 5561 - Neurobiology Lab**0 credit hours**

Corequisite: BIOL 5560.

BIOL 5570 - Principles of Toxicology**3 credit hours**

Prerequisites: BIOL 1110/1111, 1120/1121; CHEM 1110/1111, 1120/1121, 3010/3011. Corequisite: BIOL 5571. Adverse effects of chemical agents on living organisms; current toxicological techniques in laboratory portion of course. Two hours lecture and one three-hour laboratory.

BIOL 5571 - Principles of Toxicology Lab**0 credit hours**

Corequisite: BIOL 5570.

BIOL 5580 - Marine Biology**4 credit hours**

Prerequisites: BIOL 1110/1111, 1120/1121; CHEM 1110/1111, 1120/1121. Corequisite: BIOL 5581.

Biological, chemical, and physical characteristics of major marine environments and their associated flora and fauna. Three lectures and one three-hour laboratory.

BIOL 5581 - Marine Biology Lab

0 credit hours

Corequisite: BIOL 5580.

BIOL 6070 - Plants and Man

3 credit hours

Prerequisite: BIOL 1120/1121. Human dependence on plants emphasized. Topics include origin of agriculture, fruits and nuts, grains and legumes, vegetables, spices and herbs, oils and waxes, medicinal plants, psychoactive plants, beverages, fibers and dyes, tannins, wood and ornamental plants. Three lectures.

BIOL 6080 - Advanced Mycology

4 credit hours

Prerequisites: Graduate standing plus BIOL 1120/1121. Corequisite: BIOL 6081. Fungi, with emphasis on taxonomy, morphology, culture, and importance to humans. Three lectures and one three-hour laboratory.

BIOL 6081 - Advanced Mycology Lab

0 credit hours

Corequisite: BIOL 6080.

BIOL 6090 - Advanced Forest Ecology

4 credit hours

Prerequisites: Graduate standing and a grade of C or better in each of the following: BIOL 3250/3251, BIOL 3400, and BIOL 3500 or permission of instructor. Ecological form and function of forested systems with a particular emphasis on communities of the southeastern U.S. and Tennessee. Topics include dendrology, community assembly and disassembly over time, abiotic and biotic drivers of forest community succession, phylogeography and biogeography, and threats and sustainable practices. Three hours lecture and one three-hour laboratory.

BIOL 6120 - Aquatic Ecology

3 credit hours

Physical, chemical, and biotic conditions of freshwater lakes and streams and of population structure and dynamics in these environments. Five hours lecture/laboratory.

BIOL 6130 - Ornithology

3 credit hours

Corequisite: BIOL 6131. Structure, taxonomy, natural history, and identification of birds. Emphasizes field work. Two lectures and one three-hour laboratory.

BIOL 6131 - Ornithology Lab

0 credit hours

Corequisite: BIOL 6130.

BIOL 6180 - Mammalogy

3 credit hours

Corequisite: BIOL 6181. Morphology, physiology, systematics, and the development of mammals. Two lectures and one three-hour laboratory.

BIOL 6181 - Mammalogy Lab

0 credit hours

Corequisite: BIOL 6180.

BIOL 6190 - Animal Physiological Ecology

4 credit hours

Prerequisites: Graduate standing and one course in either ecology or physiology. A study of how animals function in and respond to their natural environments with special interest at the biochemical, physiological, morphological, and behavioral levels. Topics include allometry, heat transfer, thermoregulation, energetics, blood circulation, respiration, osmoregulation, locomotion, control systems, and sensory perception. Six hours lecture/laboratory.

BIOL 6200 - Speciation

3 credit hours

Prerequisite: BIOL 3250/3251. Mutation, natural selection, adaptation, isolating mechanisms, genetic drift, hybridization, ploidy in the process of species formation, and a history of the development and ideas of evolution. Two lectures.

BIOL 6210 - Protozoology

3 credit hours

Corequisite: BIOL 6211. Morphology, physiology, reproduction, ecology, taxonomy, and life cycles of the protozoa. Two lectures and one three-hour laboratory.

BIOL 6211 - Protozoology Lab

0 credit hours

Corequisite: BIOL 6210.

BIOL 6220 - Herpetology**3 credit hours**

Prerequisite: BIOL 3400/3401. Corequisite: BIOL 6221. Morphology, natural history, and identification of amphibians and reptiles. Local representatives emphasized. Two lectures and one three-hour laboratory.

BIOL 6221 - Herpetology Lab**0 credit hours**

Corequisite: BIOL 6220.

BIOL 6250 - Genomics**3 credit hours**

Prerequisites: BIOL 3250/3251 and STAT 3150 or equivalent courses or consent of instructor. Theory and practice of acquiring and analyzing whole-genome sequences and gene products. Genetic variation and patterns within genetic material and gene products of living organisms investigated. Three hours lecture/problem solving.

BIOL 6270 - Cell Metabolism and Human Disease**3 credit hours**

(Same as BIOL 7270). Prerequisites: BIOL 4110/4111; CHEM 3010/3011 and CHEM 3530/3531. Metabolic pathways of mammalian cells and the diseases that result from genetic defects that disrupt their normal function.

BIOL 6290 - Advanced Scanning Electron Microscopy**4 credit hours**

Prerequisite: Permission of instructor. Application of scanning electron microscopy to study materials with emphasis on theory of scanning electron microscopy and preparation of biological specimens for microscopy. Seven hours lecture/laboratory.

BIOL 6350 - Biostatistical Analysis**4 credit hours**

Prerequisites: BIOL 3250/3251; MATH 1910. Corequisite: BIOL 6351. Intermediate-level introduction to biostatistical procedures used in research. Three lectures and one three-hour laboratory.

BIOL 6351 - Biostatistical Analysis Lab**0 credit hours**

Corequisite: BIOL 6350.

BIOL 6360 - Energy Dispersive X-Ray Theory and Analysis**1 credit hours**

Prerequisite: BIOL 4290 or BIOL 6290. Theory of X-ray analysis and elemental analysis of materials using an energy dispersive X-ray system with scanning electron microscopy. One three-hour laboratory.

BIOL 6380 - Experimental Immunology**4 credit hours**

Prerequisite: BIOL 2230/2231. Corequisite: BIOL 6381. Mechanisms of immunity including the more recent developments in immunology. Three lectures and one three-hour laboratory.

BIOL 6381 - Experimental Immunology Lab**0 credit hours**

Corequisite: BIOL 6380.

BIOL 6390 - Advanced Cell and Molecular Biology**4 credit hours**

Prerequisites: BIOL 2230/2231, 3250/3251; CHEM 2030/2031 or 3010/3011. Corequisite: BIOL 6391. Molecular biology of the cell with emphasis on current experimental techniques. Three lectures and one three-hour laboratory.

BIOL 6391 - Advanced Cell and Molecular Biology Lab**0 credit hours**

Corequisite: BIOL 6390.

BIOL 6410 - Advanced Transmitting Electron Microscopy**4 credit hours**

Prerequisite: Permission of instructor. Ultrastructure of the cell using basic and specialized techniques. Seven hours lecture/laboratory.

BIOL 6430 - Clinical and Pathogenic Microbiology**4 credit hours**

Prerequisite: BIOL 2230/2231. Comprehensive coverage of the most recent discoveries and techniques used for the identification of pathogenic organisms and their relationships to disease processes. Six hours lecture/laboratory.

BIOL 6440 - Advanced Virology**4 credit hours**

Prerequisites: BIOL 2230/2231; CHEM 1110/1111 and 1120/1121. Emphasizes the main virus families and their biochemical composition. Experimental approaches and techniques will be developed in order

to identify and manipulate viruses. Six hours lecture/laboratory.

BIOL 6450 - Advancements in Molecular Genetics
4 credit hours

Prerequisites: BIOL 2230/2231 and 3250/3251; CHEM 1110/1111 and 1120/1121. Recent advancements in microbial genetics and gene manipulation with emphasis on applications of molecular genetics, including gene regulation and recombinant DNA technology. Six hours lecture/laboratory.

BIOL 6460 - Conservation Biology
4 credit hours

Prerequisite: BIOL 3400/3401. Measuring biodiversity: species, ecosystem, and genetic diversity. Topics include conservation ethics, extinctions, habitat degradation, exotic species, and management of populations and ecosystems. Six hours lecture/laboratory.

BIOL 6500 - Special Problems in Biology
4 credit hours

Prerequisite: Permission of department. Plan, implement, and interpret a research problem in some area of biology. Available topics limited to areas of graduate faculty interest and expertise.

BIOL 6590 - Environmental Toxicology
4 credit hours

Prerequisites: BIOL 1110/1111, 1120/1121; CHEM 1110/1111, 1120/1121, and 3010/3011. Ecological effects of chemicals in the environment and techniques currently utilized to assess these effects. Current environmental assessment techniques, including biomonitoring, will be covered in the laboratory. Six hours lecture/laboratory.

BIOL 6620 - Biological Research
3 credit hours

Prerequisite: Permission of department. Selection of a research problem, review of pertinent literature, and execution of the research.

BIOL 6640 - Thesis Research
1 to 6 credit hours

Prerequisites or corequisites: BIOL 6620 and permission of department. Completion of the research problem begun in BIOL 6620; preparation of the thesis. Once enrolled, student should register for at least one credit hour of master's research each

semester until completion. Minimum of three credits required for M.S. degree. S/U grading.

BIOL 6650 - Seminar
1 credit hours

Discussion and critical evaluation of the primary scientific literature. Responsible conduct of research topics including data management, publication practices, peer review, and collaborative science emphasized. One two-hour session.

BIOL 6660 - Seminar
2 credit hours

Development of written and oral communication skills relevant to obtaining research funding and presenting research results. Responsible conduct of research topics including mentor/trainee relationships, human subjects, animal research, research misconduct, and conflicts of interest emphasized. Two one-hour sessions.

BIOL 6700 - Plant-Animal Interactions
3 credit hours

Prerequisite: BIOL 1110/1111, 1120/1121. Corequisite: BIOL 6701. Evolutionary and ecological perspectives on how plants attract and repel symbionts and how those symbionts influence plant fitness. Topics include angiosperm evolution, the coevolution of plants with pollinators, herbivores, mycorrhizae, and N-fixing bacteria, and how plant secondary metabolites facilitate or mitigate these interactions. Two hours lecture and three hours lab.

BIOL 6701 - Plant-Animal Interactions Lab
0 credit hours

Corequisite: BIOL 6700.

BIOL 6720 - Advanced Animal Development
4 credit hours

Prerequisites: BIOL 3250/3251; BIOL 4210/4211 or BIOL 6390/BIOL 6391 recommended. Corequisite: BIOL 6721. Processes and underlying molecular mechanisms by which a single fertilized egg develops into an adult organism. Focuses on vertebrate development, including insights gained from other model organisms. Three hours lecture and two hours lab.

BIOL 6721 - Advanced Animal Development Lab
0 credit hours

Corequisite: BIOL 6720.

BIOL 6730 - Advanced Microbial Physiology and Biochemistry

4 credit hours

Prerequisites: BIOL 2230/2231; CHEM 1110/1111, 1120/1121, and 2030/2031 or 3010/3011 or consent of instructor. Survey of the physiology and biochemistry of prokaryotic and eukaryotic microorganisms. Six hours lecture/laboratory.

BIOL 6740 - Brain Development and Learning Disabilities

1 credit hours

Prerequisite: Permission of department. Biology and psychology underlying dyslexia and other common learning disabilities encountered in the school setting. Addresses practical classroom applications utilizing this background information. Five three-hour class meetings.

BIOL 6750 - Advanced Plant Biotechnology

4 credit hours

Prerequisites: BIOL 1110/1111, 1120/1121, 3250/3251. Processes and reasoning behind the human manipulation of plant species for agricultural and technological purposes. Topics include traditional breeding techniques, tissue culture, plant cell transformation, and general plant molecular biology techniques as well as current debate over genetically modified organisms. Six hours lecture/laboratory.

BIOL 6760 - Bioinformatics

4 credit hours

Prerequisites: BIOL 1110/1111 and 1120/1121 and CSCI 1170 or consent of instructor. Explores the emerging field of bioinformatics which involves the application of computer science to biological questions. Bioinformatics applies to the computational aspects of data gathering, processing, storage, analysis, and visualization methods used in revising and testing biological hypotheses. Student should have a strong background in either computer science or biology, be willing to learn about the other field in an accelerated fashion, and be willing to work cooperatively as part of an interdisciplinary team. Four hours of lecture/problem solving per week.

BIOL 6770 - Issues in Biotechnology

2 credit hours

Prerequisite: BIOL 4550/4551, BIOL 5550/5551, or 4750/BIOL 6750. Explores current and emerging issues in biotechnology. Students will be asked to solve problems drawn from biotechnology industry. Seminars, field trips, and case study work.

BIOL 6780 - Principles of Systematics

4 credit hours

Prerequisites: BIOL 3250/3251 and 3500. Theory and practice of biological systematics. Concepts of characters and taxa, methods of phylogenetic inference, and applications of systematic data addressed. Five hours lecture, discussion, and laboratory exercises.

BIOL 6850 - Intermediate Life Science

3 credit hours

Prerequisite: Permission of instructor and one undergraduate biology course. Uses a process-oriented approach to the study of life science with emphasis on execution and analysis of content-based activities and experiments suited to actual classroom situations. (May not be used for biology majors or minors.)

BIOL 6999 - Comprehensive Examination and Preparation

1 credit hours

Open only to students who are not enrolled in any other graduate course and who will take the master's comprehensive examination during the term. The student must contact the graduate advisor during the first two weeks of the term for specifics regarding the details of this comprehensive examination preparatory course. Credit may not be applied to degree requirements.

BIOL 7010 - Analysis of Genetic Markers

4 credit hours

Prerequisites: BIOL 3500 and BIOL 6350/BIOL 6351 or STAT 6020. Overview of the use of genetic markers to answer ecological and evolutionary questions. Applications of phylogenetics, population genetics, and identification of individuals. Labs integrated with lectures to cover major algorithms and software. Four hours of lecture/problem solving per week.

BIOL 7250 - Genomics

3 credit hours

Prerequisites: BIOL 3250/3251 and STAT 3150 or equivalent courses or consent of instructor. Theory and practice of acquiring and analyzing whole-genome sequences and gene products. Genetic variation and patterns within genetic material and gene products of living organisms investigated. Three hours lecture/problem solving.

BIOL 7270 - Cell Metabolism and Human Disease
3 credit hours

Prerequisites: BIOL 4110/4111; CHEM 3010/3011 and CHEM 3530/3531. Provides a detailed overview of the major metabolic pathways in humans and explores how dysfunction of these pathways, through genetic mutation or other means, leads to disease. Three hours lecture/case study-based problem solving per week.

BIOL 7800 - Teaching Internship
3 credit hours

Prerequisite: Permission of department. Admission based on recommendations and performance in teaching.

BIOL 7810 - Teaching Internship
3 credit hours

Prerequisite: Permission of department. Admission based on recommendations and performance in teaching.

BIOL 7850 - Intermediate Life Science
3 credit hours

Prerequisite: Permission of instructor and one undergraduate biology course. Uses a process-oriented approach to the study of life science with emphasis on execution and analysis of content-based activities and experiments suited to actual classroom situations. (May not be used for biology majors or minors.)

BIOL 7900 - Teaching and Learning Biology
3 credit hours

Prerequisite: Permission of instructor. Overview of biology education with an emphasis on how students learn biology and current best practices for teaching biological concepts. Primary literature of the field featured as course emerges through lectures, discussion, small group activities, and group/individual presentations. Capstone experience will be student's development of an instructional unit of study including the formal teaching of selected biological concepts. Three hours lecture/discussion.

Chemistry

Greg Van Patten, Chair

(615) 898-2956

www.mtsu.edu/chemistry/

The Department of Chemistry offers a Master of Science degree with a major in Chemistry. The department also participates in the interdisciplinary Ph.D. programs in Computational Science, Molecular Biosciences, and Mathematics and Science Education and its concentrations in Biological Education, Chemical Education, Mathematics Education, and Interdisciplinary Science Education. Also offered is a minor in Chemistry at the graduate level.

Chemistry Minor

There are two patterns of minors from which a candidate may choose:

1. A single minor consisting of at least 12 semester hours; 12 undergraduate hours in an area are prerequisite to a single minor in that area at the master's level.
2. A minor consisting of a minimum of 6 semester hours in each of two subjects. The candidate is expected to complete the total program in the major, minor, and/or cognate fields. A cognate is defined as 6 semester hours.

Chemistry, M.S.

Charles Chusuei, Program Director

(615) 898-2079

Charles.Chusuei@mtsu.edu

The Department of Chemistry offers a Master of Science degree with a major in Chemistry. The department also participates in the interdisciplinary Ph.D. programs in Computational Science, Molecular Biosciences, and Mathematics and Science Education and its concentrations in Biological Education, Chemical Education, Mathematics Education, Interdisciplinary Science Education. Also offered is a minor in Chemistry at the graduate level.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Applications for admission are considered year-round with preference being given to students who apply by the following deadlines: March 1 for Summer/Fall, and October 1 for Spring.

Admissions are based on a comprehensive assessment of a candidate's qualifications including a satisfactory score on the Graduate Record Examination (GRE) and undergraduate and graduate grade point average.

An applicant must have an undergraduate minor in chemistry or its equivalent at time of admission.

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

Applicant must

1. submit an application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit official scores on the Graduate Record Examination (GRE);
3. submit official transcripts of all previous college work.

Degree Requirements

The Master of Science in Chemistry requires a minimum of 30 semester hours with no more than 30 percent of the total degree hours dually listed as undergraduate/graduate.

Candidate must

1. prepare an annual plan of study for the following twelve months with the academic advisor;
2. successfully complete and present an original thesis approved by the student's advisory committee;
3. successfully complete a comprehensive examination in conjunction with the defense of the thesis (may be taken no more than twice).

Curriculum: Chemistry

Candidate must complete 30 hours in the following course of study:

Required Core Courses (25 hours)

- CHEM 6100 - Intermediate Organic Chemistry **3 credit hours**
- CHEM 6230 - Intermediate Analytical Chemistry **4 credit hours** * AND
- CHEM 6231 - Intermediate Analytical Chemistry Lab **0 credit hours**
- CHEM 6300 - Intermediate Physical Chemistry **3 credit hours**
- CHEM 6400 - Intermediate Inorganic Chemistry **3 credit hours**
- CHEM 6640 - Thesis Research **1 to 6 credit hours (3-8 credit hours count toward 30 degree hours)**

- CHEM 6800 - Thesis Defense **1 credit hours**
- CHEM 6870 - Chemistry Research **3 credit hours**
** Quantitative Analysis is a prerequisite for this course; can be taken for undergraduate credit after admission.*
NOTE: Exceptionally well-prepared students may substitute another approved graduate chemistry course in the same area for the core course by successful performance on a proficiency examination in that core curriculum area.

Electives (5 hours)

Complete a minimum of 5 credit hours of additional approved chemistry graduate courses or approved cognate courses in biology, mathematics, computer science, or physics.

Program Notes

Candidate must

1. file a degree plan in the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which candidate intends to graduate.

Chemistry

CHEM 5100 - Organic Spectroscopy **3 credit hours**

Prerequisite: CHEM 3020 or equivalent. Theory of and practice in the interpretation of mass, infrared, Raman, ultraviolet-visible, and nuclear magnetic resonance spectra. Offered every other spring.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 5330 - Physical Chemistry Fundamentals **4 credit hours**

Modern physical chemistry including current theories of atomic and molecular structures, chemical thermodynamics, electrochemistry, chemical kinetics, and related theoretical topics. Three lectures and one three-hour laboratory period. Offered every year.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 5331 - Physical Chemistry Fundamentals Lab

0 credit hours

Offered every year.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 5340 - Physical Chemistry Fundamentals **4 credit hours**

Modern physical chemistry including current theories of atomic and molecular structures, chemical thermodynamics, electrochemistry, chemical kinetics, and related theoretical topics. Three lectures and one three-hour laboratory period. Offered every year.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 5341 - Physical Chemistry Fundamentals Lab

0 credit hours

Offered every year.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 5350 - Physical Chemistry **4 credit hours**

Quantitative principles of chemistry involving extensive use of calculus. Major topics include thermodynamics, phase changes, chemical equilibria, electrochemistry, reaction kinetics, quantum chemistry, molecular structure, and statistical mechanics. Three lectures and one three-hour laboratory period. Offered every year.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 5351 - Physical Chemistry Lab

0 credit hours

Offered every year.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 5360 - Physical Chemistry **4 credit hours**

Quantitative principles of chemistry involving extensive use of calculus. Major topics include thermodynamics, phase changes, chemical equilibria, electrochemistry, reaction kinetics, quantum chemistry, molecular structure, and statistical mechanics. Three lectures and one three-hour laboratory period. Offered every year.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 5361 - Physical Chemistry Lab**0 credit hours**

Offered every year.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 5400 - Inorganic Chemistry**3 credit hours**

Basic concepts and theories of inorganic chemistry and how these are used to predict and understand the physical and chemical properties of compounds of the elements other than carbon. Inorganic compounds in the air, water, earth, and in the laboratory, and in biochemistry, geochemistry, and industrial materials and processes. Offered on sufficient demand.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 5600 - Introduction to Environmental Chemistry**3 credit hours**

Introduces major environmental issues including climate change, water quality, air pollution, landfills, hazardous wastes, fossil fuels, and alternative energy. Explores the quality of the environment and the changes in the environment due to contamination. Offered every fall.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 5630 - Detection of Chemical Pollutants**4 credit hours**

Theory and practice of analytical chemistry methods used in pollution measurement. Three lectures and one three-hour laboratory period. Offered every other spring.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 5631 - Detection of Chemical Pollutants Lab**0 credit hours**

Offered every other spring.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 5700 - Polymers, an Introduction**3 credit hours**

Structure, properties, and applications of polymers. Offered every other spring.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 5730 - Advanced Physical Chemistry**4 credit hours**

Modern chemical concepts and computations applied to quantum chemistry, molecular spectroscopy, and statistical thermodynamics. Three lectures and one three-hour calculation laboratory period. Offered on sufficient demand.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 5731 - Advanced Physical Chemistry Lab**0 credit hours**

Offered on sufficient demand.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 6100 - Intermediate Organic Chemistry**3 credit hours**

Prerequisite: CHEM 3020/3021 or 2030/2031 or equivalent. Concepts and modern theories of organic chemistry: stereochemistry of reactions, mechanistic interpretation of organic reactions, and multistep synthesis. Offered every fall.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as

listed for the corresponding 4000-level courses in the undergraduate catalog.

**CHEM 6110 - Topics in Organic Chemistry
3 to 6 credit hours**

Prerequisite: CHEM 6100. A selection of modern topics. Offered every other spring.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

**CHEM 6150 - Bioorganic Chemistry
3 credit hours**

Prerequisite: CHEM 3020 or equivalent. Focuses on the structure and function of bioorganic molecules (i.e., peptides, proteins, nucleic acids, carbohydrates, and peptidomimetics), similarities between enzymatic reactions and bench-top organic reactions, and the techniques and instrumentation used to study bioorganic molecules.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

**CHEM 6200 - Topics in Analytical Chemistry
3 to 6 credit hours**

Prerequisite: CHEM 4230/4231 or CHEM 6230/CHEM 6231. Selected topics of major interest in chemical analysis. Offered every other fall.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

**CHEM 6230 - Intermediate Analytical Chemistry
4 credit hours**

Prerequisite: CHEM 2230/2231 or equivalent. Selected instrumental methods of analysis including but not limited to gas and liquid chromatography methods; ultraviolet, visible, and infrared spectroscopic methods; and flame emission and atomic absorption spectrometry. Three lectures and one three-hour laboratory period. Offered every spring.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as

listed for the corresponding 4000-level courses in the undergraduate catalog.

**CHEM 6231 - Intermediate Analytical Chemistry
Lab**

0 credit hours

Offered every spring.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

**CHEM 6300 - Intermediate Physical Chemistry
3 credit hours**

Key concepts from classical thermodynamics, quantum theory, and chemically relevant spectroscopies. Statistical thermodynamics introduced. Offered every spring.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

**CHEM 6310 - Modeling Organic and Biological
Molecules**

3 credit hours

Prerequisites: CHEM 3010/CHEM 3011 and CHEM 3020/CHEM 3021 or permission of instructor. Basic concepts of molecular modeling and utilization of corresponding visualization and computation software tools with applications to organic and biological molecules. Students should bring their own problems related to research interests to model.

**CHEM 6400 - Intermediate Inorganic Chemistry
3 credit hours**

Concepts of inorganic chemistry needed for effective teaching of general chemistry and for safe and effective use of inorganic chemicals and materials in industrial and academic laboratories; atomic theory, principles of inorganic reactivity in acid-base; precipitation, complexation, and oxidation-reduction reactions; crystal and ligand field theory; symmetry; molecular orbital theory; organometallic chemistry. Offered every fall.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 6410 - Transition Metal and Theoretical Inorganic Chemistry

3 credit hours

Prerequisite: CHEM 5400 or consent of instructor. The chemistry of transition metal complexes, organometallic compounds, and of related compounds, their practical applications, and modern theoretical treatments of this chemistry. Offered on sufficient demand.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 6420 - Topics in Inorganic Chemistry

3 to 6 credit hours

Prerequisite: CHEM 6400. Selected topics of current interest in inorganic chemistry such as organometallic chemistry, inorganic materials science, and kinetics and mechanisms of inorganic reactions. Offered every other spring.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 6480 - Laboratory in Inorganic Chemistry-Inorganic Synthetic Methods

1 credit hours

Prerequisite or corequisite: CHEM 6400 or consent of instructor. Offered every other fall.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 6490 - Laboratory in Inorganic Chemistry-Physical Methods in Inorganic Chemistry

1 credit hours

Prerequisite or corequisite: CHEM 6420 or CHEM 5700 or consent of instructor. Offered every other fall.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 6500 - Biochemistry I

3 credit hours

Chemical properties of biological molecules such as proteins, lipids, nucleotides, and carbohydrates. Chemical basis of enzyme catalysis. Structure of biological membranes. Offered every fall.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 6510 - Biochemistry II

3 credit hours

Prerequisite: CHEM 6500. The structure of lipids, amino acids, nucleotides, and nucleic acids and their metabolism at a molecular level. Emphasis on understanding the chemical basis of biological phenomena. Three hours lecture per week. Offered every spring.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 6520 - Topics in Biochemistry

3 to 6 credit hours

Prerequisite: CHEM 6500 or CHEM 6510 or consent of instructor. Selected topics of particular interest in biochemistry. Offered every spring.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 6530 - Biochemical Techniques

2 credit hours

Prerequisite/corequisite: CHEM 6500 or CHEM 6510 or consent of instructor. Laboratory in biochemical techniques with emphasis on protein purification, enzyme kinetics, carbohydrate and lipid analysis, and manipulation of DNA. Offered every spring.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 6610 - Environmental Chemistry**3 credit hours**

Fundamental chemical principles applied to the fate and behavior of contaminants in soil-water environments. Explores important toxins and explains their movement and occurrence in ecosystems based on chemical and physical parameters. Topics will include pesticides, dioxin, mercury, and bioaccumulation.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 6640 - Thesis Research**1 to 6 credit hours**

Selection of a research problem, review of pertinent literature, collection and analysis of data, and composition of thesis. Once enrolled, student should register for at least one credit hour of master's research each semester until completion. S/U grading. Offered every term.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 6720 - Topics in Physical Chemistry**3 to 6 credit hours**

Prerequisite: CHEM 6300 or permission of department. Advanced theories of, latest literature in, and unsolved problems of a particular research area in physical chemistry selected by the professor. Offered every other fall.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 6780 - Polymer and Materials Chemistry Laboratory**2 credit hours**

Prerequisite: CHEM 6100 or previous undergraduate organic chemistry knowledge; corequisite: CHEM 5700; CHEM 5330/CHEM 5331 strongly recommended. Laboratory experiments introduce synthesis techniques, kinetics, characterization, engineering, and application of polymers and other modern materials. Six hours of laboratory.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level

courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 6800 - Thesis Defense**1 credit hours**

Required of graduate students specializing in chemistry. Scientific articles reviewed and reports on individual research projects presented. Offered every term.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 6870 - Chemistry Research**3 credit hours**

Original laboratory problem that will furnish material for a thesis. Offered every fall.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 7110 - Advanced Topics in Organic Chemistry**3 credit hours**

Prerequisite: CHEM 6110. Applications and advanced concepts in physical organic chemistry, including those used in teaching organic chemistry. Topics include classical and modern approaches in physical organic chemistry including MO theory, conformational analysis, stereochemistry, reaction mechanisms, structure and solvent effects, pericyclic reactions, and theories of acidity/basicity. Offered every other spring.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 7200 - Advanced Chemical Separations and Chemical Equilibrium**3 credit hours**

Prerequisite: CHEM 6230/CHEM 6231 or equivalent including a course in quantitative chemical analysis. Advances in theories and applications of analytical chemistry for students familiar with laboratory techniques and chemical instrumentation. Special attention given to chemical equilibrium as it applies to

the practice and teaching of chemical separations. Offered every other fall.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 7210 - Problems in Modern Chemical Laboratory Procedures

3 credit hours

Newly developed laboratory techniques and procedures which the student had not previously had the opportunity to learn. Offered on sufficient demand.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 7220 - Independent Study of Instrumental Analysis

3 credit hours

Developing skill in using selected sophisticated instruments. Offered on sufficient demand.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 7400 - Computational Chemistry I

4 credit hours

Prerequisite: Foundation courses of the Computational Science Ph.D. program (COMS 6100, COMS 6500, and CSCI 6020) or consent of instructor. Fundamental concepts and practical aspects of various electronic-structure models used in modern computational chemistry. Molecular orbital theory, ab initio and density functional methods, wave-function analyses, and geometry optimization techniques. Offered every fall. Three lectures and one three-hour computer lab.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 7410 - Computational Chemistry II

4 credit hours

Prerequisites: CHEM 7400 and consent of instructor. Practical applications of quantum chemistry models.

Calculation of molecular properties with high accuracy, computational techniques for large systems, structure prediction and structure-activity relationships. Offered every spring. Three lectures and one three-hour lab.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 7420 - Advanced Topics in Inorganic Chemistry

3 credit hours

Prerequisite: CHEM 6400. Applications and advanced concepts of inorganic chemistry; methods of teaching these concepts. Inorganic materials such as metals, superconductors, zeolites, and fullerenes; organometallic compounds, halides, hydrides, and oxides of elements; inorganic reaction mechanisms; bioinorganic chemistry; electronic states and term symbols. Modern methods of teaching inorganic content in general chemistry courses. Offered every other spring.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 7510 - Advanced Biochemistry

3 credit hours

Prerequisite: CHEM 6500 or consent of instructor. Advanced subjects in biochemistry including current techniques in structure/activity relationships of biomolecules, regulation and control of metabolic pathways, bioenergetics, enzymology, control of transcription and translation, regulation of gene expression, and biochemistry of inherited disease. Offered every other fall.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

CHEM 7640 - Dissertation Research

1 to 6 credit hours

Selection of a research problem, review of pertinent literature, collection and analysis of data, and composition of dissertation. Once enrolled, student should register for at least one credit hour of doctoral research each semester until completion. S/U grading. Offered every term.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

**CHEM 7700 - Topics in Theoretical Chemistry
3 to 6 credit hours**

Bonding, stereochemistry, empirical and semi-empirical parameters, state functions, spectroscopic interpretation, and reaction mechanisms. Offered on sufficient demand.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

**CHEM 7710 - Topics in Applied Chemistry
3 to 6 credit hours**

Some important and current practical applications. Offered every other spring.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

**CHEM 7720 - Advanced Topics in Physical Chemistry
3 credit hours**

Prerequisite: CHEM 6300. Theoretical basis and application of the principal methods used for experimental molecular structure determination. Computational methods of structure prediction and interpretation of data. Searching and retrieving structural information from structural databases. Offered every other fall.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

**CHEM 7800 - Chemistry Internship
3 credit hours**

Prerequisite: Permission of department. Admission based on recommendations and performance in teaching. Offered every term.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as

listed for the corresponding 4000-level courses in the undergraduate catalog.

**CHEM 7810 - Chemistry Internship
3 credit hours**

Prerequisite: Permission of department. Admission based on recommendations and performance in teaching. Offered every term.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

**CHEM 7820 - Seminar in Chemical Education
1 credit hours**

Areas and ideas associated with chemical education. Readings from current literature or seminal texts on given topics which may include the role of laboratory in chemical education, current research in science education, trends in chemical education, research techniques in chemical education, and the historical development of chemistry. Offered online. May be taken up to three times for credit. Offered every fall.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

**CHEM 7900 - Teaching and Learning in Chemistry
3 credit hours**

Areas and ideas associated with chemical education. Readings from the current literature or seminal texts on misconceptions in chemistry, theories of learning, and theories of teaching. Offered summer only.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

**CHEM 7910 - Instructional Technology in the Science Classroom
3 credit hours**

Explores concepts and applications associated with the use of computer- and other technology-based instructional materials in the science classroom. Readings from current literature or seminal texts on theoretical issues; practical applications associated with the use of technology in teaching scientific concepts. Offered summer only.

NOTE: Graduate standing is the prerequisite for graduate courses in chemistry. The 5000-level courses also have the same prerequisites as listed for the corresponding 4000-level courses in the undergraduate catalog.

Physical Science

PSCI 5030 - Experimental Physical Science 4 credit hours

Basic concepts, laws, and principles of astronomy, chemistry, geology, and physics with particular emphasis on the utilization of equipment available or easily improvised in actual school situations to illustrate these concepts, laws, and principles. Offered every term.

PSCI 5080 - Problems in Physical Science 4 credit hours

A problem from chemistry, physics, or other physical science appropriate to the student's background and interest. Offered on sufficient demand. May be repeated for a total of eight credits with departmental approval.

PSCI 6020 - Investigations in Physical Science 1 to 3 credit hours

Prerequisite: Graduate standing or consent of instructor. Topics from astronomy to chemistry and physics, with special emphasis on the development of hands-on activities, determination of content cognitive demand, development of appropriate assessment

instruments/implementation plans, and implementation of these across the pre-college curriculum. For practicing pre-college science teachers and school administrators. Consult the listed instructor for costs and specific credits. Does not apply toward chemistry graduate degrees. Offered on sufficient demand. May be repeated for a total of six credits with departmental approval. Repeatable for up to six credit hours.

PSCI 6800 - Intermediate Physical Science 3 credit hours

Selected concepts and theories within the physical sciences of astronomy, chemistry, geology, and physics such as the solar system and the Earth, physical and chemical changes, chemical bonding, acids and bases, rocks and minerals, density, kinematics, electricity, and magnetism. Particular emphasis placed on developing strong content and pedagogical content knowledge in these areas.

PSCI 7800 - Intermediate Physical Science 3 credit hours

Selected concepts and theories within the physical sciences of astronomy, chemistry, geology, and physics such as the solar system and the Earth, physical and chemical changes, chemical bonding, acids and bases, rocks and minerals, density, kinematics, electricity, and magnetism. Particular emphasis placed on developing strong content and pedagogical content knowledge in these areas.

Computer Science

Chrisila Pettey, Chair

(615) 898-2397

www.mtsu.edu/csc/

The Department of Computer Science offers the Master of Science with a major in Computer Science and a minor at the graduate level. The department also offers courses and participates in the Ph.D. in Computational Science.

Computer Science Minor

There are two patterns of minors from which a candidate may choose:

1. A single minor consisting of at least 12 semester hours; 12 undergraduate hours in an area are prerequisite to a single minor in that area at the master's level.
2. A minor consisting of a minimum of 6 semester hours in each of two subjects. The candidate is expected to complete the total program in the major, minor, and/or cognate fields. A cognate is defined as 6 semester hours.

Computer Science, M.S.

Dr. Zhijiang Dong, Program Director

(615) 904-8428

Zhijiang.Dong@mtsu.edu

The Department of Computer Science offers the Master of Science with a major in Computer Science and a minor at the graduate level. The department also offers courses and participates in the Ph.D. in Computational Science. In addition, the department offers the Accelerated Bachelor's/Master's Program allowing exceptional undergraduate students an opportunity to complete the requirements for both the bachelor's and master's degrees within five years by enrolling in the program during their junior year. Students interested in this program should contact the graduate program director for additional information.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admission to the Master of Science in Computer Science program requires a satisfactory Graduate Record Examination score. Applicants with a 3.3 or higher undergraduate GPA for all computer science courses taken at MTSU (which must include at least 15 upper-division CSCI hours), are not required to submit a GRE score for admission to the graduate program.

Applicant must also meet the following requirements:

1. have completed CSCI 1170, 2170, 3080, 3110, 3130, and 3240 or equivalent of each course;
2. have completed MATH 1910 and 2050 or equivalent of each course.

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

Applicant must

1. submit an application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit official scores from the Graduate Record Examination (GRE);
3. submit official transcripts showing an acceptable GPA in previous academic work.

Degree Requirements

The Master of Science in Computer Science offers two options: the Thesis Option and the Non-Thesis Option.

Students pursuing either option must meet the following requirements:

1. complete CSCI 5700 if he or she did not complete CSCI 4700 or an equivalent course as an undergraduate;
2. complete CSCI 5560 if he or she did not complete CSCI 4560 or an equivalent course as an undergraduate;
3. complete CSCI 6620 as part of their required 30 hours (Thesis option) or 36 hours (Non-Thesis option).

Curriculum: Computer Science

Candidate must complete 30 (thesis option) or 36 (non-thesis option) hours in the following curriculum:

Thesis Option (30 hours)

The Master of Science in Computer Science requires a completion of 30 hours of graduate coursework in the thesis option. Up to 3 hours in CSCI 6640 may be included in the 30 hours. Students must present an oral defense of the thesis. A minimum of 21 hours must be at the 6000 level.

Non-thesis Option (36 hours)

The Master of Science in Computer Science requires completion of 36 hours of graduate coursework in the non-thesis option. Candidates must successfully complete a comprehensive examination. Credit for CSCI 6640 may not be included in the 36 hours. A minimum of 24 hours must be at the 6000 level.

Notes

A student already holding a master's degree from MTSU may complete a second master's degree in Computer Science by satisfying either of the above options with a minimum of 27 semester hours. A minimum of 18 hours must be at the 6000 level.

With the approval of the Computer Science graduate faculty, a maximum of 12 semester hours of residence credit (maximum of 6 in Computer Science) may be transferred from another institution and applied to the master's degree.

Program Notes

Candidate must

1. complete at least 24 semester hours of graduate computer science courses at MTSU;
2. file a degree plan with the College of Graduate Studies prior to entry into the program;
3. take all courses in the Computer Science Department with the following possible exceptions:
 - a. with the prior approval of the Computer Science graduate faculty, a maximum of 6 hours of cognate courses may come from departments other than Computer Science;
 - b. with the approval of the candidate's graduate advisor, a single minor up to 12 semester hours may be included. Such a minor must also be approved by the department offering the minor.
4. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which candidate intends to graduate.

Computer Science

CSCI 5160 - Compiler Design and Software Development

3 credit hours

Prerequisites: CSCI 3080, CSCI 3110, and CSCI 3160. The various phases of a compiler along with grammars, finite automata, regular expressions, LR parsing, error recovery, backward and forward flow analysis, and code optimization. A term project consisting of the design and construction of a functional compiler required.

CSCI 5250 - Computer Graphics

3 credit hours

Prerequisites: CSCI 2170 and CSCI 3080 or consent of instructor. Topics include vector drawing displays, raster scan displays, input devices and techniques, graphics software, transformations, projections, interpolation, and approximation.

CSCI 5300 - Data Communication and Networks

3 credit hours

Prerequisite: CSCI 3240 or CSCI 3250. Computer network architectures, protocol hierarchies, and the open systems interconnection model. Modeling, analysis, design, and management of hardware and software on a computer network.

CSCI 5350 - Introduction to Artificial Intelligence

3 credit hours

Prerequisites: CSCI 3110 and CSCI 3080 or equivalent. Principles and applications of artificial intelligence. Principles include search strategies, knowledge representation, reasoning, and machine learning. Applications include expert systems and natural language understanding.

CSCI 5360 - Intelligent Robot Systems

3 credit hours

Prerequisites: CSCI 2170 and CSCI 3080. Principles and applications of intelligent mobile robotics. Various architectures used in the basic AI robotics development paradigms and basic techniques used for robot navigation. Strong emphasis on hands-on mobile robot design, construction, programming, and experimentation using a variety of robot building platforms.

CSCI 5410 - Web Technologies

3 credit hours

Prerequisites: CSCI 3080 and CSCI 3110. An intensive introduction into current Web technologies

including basic HTML, tools for Web page design, XML, client-side methods, and server-side methods. Students will be required to implement several Web-based projects.

CSCI 5560 - Database Management Systems

3 credit hours

Prerequisites: CSCI 3080 and CSCI 3110. The relational and object models of database design along with relational algebras, data independence, functional dependencies, inference rules, normal forms, schema design, modeling languages, query languages, and current literature.

CSCI 5600 - Independent Study in Computer Science

1 to 6 credit hours

Prerequisite: Consent of instructor. Students wishing to enroll must submit a written course/topic proposal to the department prior to the semester in which CSCI 5600 is taken. Proposal must be approved prior to taking the course. At the conclusion of the course, each enrollee will submit a written summary of the project.

CSCI 5700 - Software Engineering

3 credit hours

Prerequisites: CSCI 3080 and CSCI 3110. Consists of a theoretical component and a practical component. Topics include the history of software engineering, software development paradigms and life cycles, and computer-aided software engineering (CASE). A team project will be developed in parallel with the theory.

CSCI 5800 - Software Testing

3 credit hours

Prerequisites: CSCI 2170 and CSCI 3080. Integrates theory and applications of software testing techniques. Provides actual hands-on testing experience. Considers multiple testing paradigms.

CSCI 5850 - Neural Nets

3 credit hours

Prerequisite: CSCI 3080. Various neural net architectures, theory, and applications, including models such as Perceptron, back propagation, Kohonen, ART, and associative memory. Learning and conditioning methods also studied.

CSCI 5900 - Selected Topics in Computer Science

3 credit hours

Prerequisite: CSCI 2170. Advanced topics in computer science to be selected and announced at

time of class scheduling. May be repeated for up to six credits total.

CSCI 6020 - Data Abstraction and Programming Fundamentals

4 credit hours

Prerequisites: Previous programming experience in a high-level language and consent of instructor.

Advanced introduction to data abstraction, problem solving, and programming. Programming language concepts, recursion, program development, algorithm design and analysis, data abstraction, objects and fundamental data structures such as stacks, queues, and trees. Three hours lecture and two hours lab.

CSCI 6050 - Computer Systems Fundamentals

4 credit hours

Prerequisite: CSCI 6020 or COMS 6100 with minimum grade of B or equivalent. Advanced introduction to computer systems. Data representations, computer arithmetic, machine-level representations of programs, program optimization, memory hierarchy, linking, exceptional control flow, virtual memory and memory management, basic network concepts, and basic concurrent concepts and programming. Three hours lecture and two hours lab.

CSCI 6100 - Analysis of Algorithms

3 credit hours

Prerequisites: CSCI 3080 and CSCI 3110 or consent of instructor. Topics include the analysis and design of algorithms; efficiency of algorithms; design approaches including divide and conquer, dynamic programming, the greedy approach, and backtracking; P and NP; and algorithms in many areas of computing.

CSCI 6180 - Software Design and Development

3 credit hours

Prerequisite: CSCI 3110. State-of-the-art techniques in software design and development; provides a means for students to apply the techniques.

CSCI 6250 - Advanced Operating Systems

3 credit hours

Prerequisite: CSCI 3240 or CSCI 3250. Topics include concurrent processes, name management, resource allocation, protection, advanced computer architecture, and operating systems implementation.

CSCI 6260 - Advanced Computer Graphics

3 credit hours

Prerequisite: CSCI 4250 or CSCI 5250. Topics include three-dimensional curves and surfaces, projections, hidden line and surface elimination, raster graphics systems, and shading techniques.

CSCI 6300 - Networks

3 credit hours

Prerequisite: CSCI 4300 or CSCI 5300. Computer communications, network architectures, protocol hierarchies, and the open systems interconnection model. Modeling, analysis, and specification of hardware and software on a computer network. Wide area networks and local area networks including rings, buses, and contention networks.

CSCI 6330 - Parallel Processing Concepts

3 credit hours

Prerequisites: [CSCI 3130 and either (CSCI 3240 or CSCI 3250)] or CSCI 6050 and a working knowledge of either C or C++. Parallel processing and programming in a parallel environment. Topics include classification of parallel architectures, actual parallel architectures, design and implementation of parallel programs, and parallel software engineering.

CSCI 6350 - Selected Topics in Artificial Intelligence

3 credit hours

Prerequisites: CSCI 3110 and CSCI 4350 or CSCI 5350. In-depth study of the principal areas of the field: artificial intelligence programming, problem-solving methods, knowledge representation methods, deduction and reasoning, and applications such as natural language processing and expert systems. Repeatable up to 6 hours.

CSCI 6430 - Selected Topics in Parallel Processing

3 credit hours

Prerequisite: CSCI 4330 or CSCI 6330. An in-depth investigation of one or more topics in parallel processing. Topic(s) to be selected by the professor. Possible topics include parallel algorithms, parallel programming languages, parallel programming tools, parallel software engineering, parallel architectures, parallel applications, and parallel VLSI. Repeatable up to 6 hours.

CSCI 6450 - Operating System Design**3 credit hours**

Prerequisite: CSCI 6250. Definition, design, and implementation of a significant operating system examining such areas as file systems, process management, memory management, input/output device management, and user interface.

CSCI 6560 - Selected Topics in Database**3 credit hours**

Prerequisite: CSCI 4560 or CSCI 5560. An in-depth investigation of one or more topics in database. Topic(s) to be selected by the professor. Possible topics include object-oriented database systems, distributed database systems, client-server database systems, deductive databases, multimedia databases, and database theory (concurrency, query optimization, recovery, security). Repeatable up to 6 hours.

CSCI 6600 - Selected Topics in Computer Science**3 credit hours**

May be repeated for up to six credits total. Prerequisites: A solid foundation in undergraduate computer science and any prerequisites determined by the instructor. An in-depth investigation of one or more topics in computer science. Topic(s) to be selected by the professor. Possible topics include search techniques, for example genetic algorithms, soft computing, object-oriented software engineering, expert systems, program verification, software quality, knowledge discovery in databases, and design of embedded software systems.

CSCI 6620 - Research Methods in Computer Science**3 credit hours**

Corequisite: Three hours of CSCI 6000-level graduate work (other than CSCI 6640) with minimum grade of B. Emphasizes communication skills, creative thinking, problem solving, and integration of knowledge from prior computer science courses. Includes a study of computer science research tools. Students will select a research problem with approval of the instructor, review pertinent literature, and produce a report using the manual of thesis writing currently approved by the College of Graduate Studies.

CSCI 6640 - Thesis Research**1 to 6 credit hours**

Prerequisite: CSCI 6620. Selection of a research problem, review of pertinent literature, collection and analysis of data, and composition of thesis. Once enrolled, student should register for at least one credit hour of master's research each semester until completion. S/U grading.

CSCI 6700 - Selected Topics in Software Engineering**3 credit hours**

Prerequisite: CSCI 4700 or CSCI 5700 or equivalent. In-depth investigation of one or more topics in software engineering selected by the professor. Possible topics include rewriting system, graph grammar, formal method, source transformation, software architecture, and reverse engineering. Repeatable up to 6 hours.

CSCI 7300 - Scientific Visualization and Databases**3 credit hours**

Prerequisites: CSCI 6020, COMS 6100, and COMS 6500 with minimum grade of B or equivalent or consent of instructor. Introduction to the concepts, theories, and applications of database and visualization methodologies for scientific data. Relational database design along with relational algebras, data independent, functional dependencies, inference rules, normal forms, schema design, modeling language, and query languages discussed. Methods corresponding to the visualization of scalar, vector, and tensor fields as well as multifield problem discussed. Database and visualization discussed in the context of scientific applications.

CSCI 7350 - Data Mining**3 credit hours**

Prerequisite: Fundamental courses in the Computational Science Ph.D. program and CSCI 6020 or equivalent or consent of instructor. Introduction to concepts, theories, techniques, issues, and applications of data mining. Data preprocessing, association rule analysis, classification analysis, cluster and outlier analysis, deviation detection, statistical modeling, consideration of emergent technologies.

Concrete and Construction Management

Heather Brown, Director

(615) 494-7658

www.mtsucim.com/

The School of Concrete and Construction Management offers a Concrete Industry Management concentration in the Business Administration program.

Concrete Industry Management

CIM 5800 - Special Problems in Concrete Industry Management

1 to 3 credit hours

Prerequisite: Permission of department. Opportunity to pursue projects of individual interest in concrete industry management. Projects may be technical and/or managerial in nature and may require any combination of literature reviews, lab work, field studies, and other research methods. A faculty member will approve a formally submitted proposal for the study, supervise progress, and grade a report and a presentation which are required upon completion of the project. May be repeated. No more than 6 hours may count toward degree.

CIM 6000 - Concrete Construction Sustainability

3 credit hours

Prerequisite: Admittance into the CIM-MBA program: Explores current topics in sustainability specifically as it relates to concrete production and general construction practices in the residential, commercial, and institutional construction segments.

CIM 6010 - Concrete Construction Troubleshooting

3 credit hours

Prerequisite: Admittance into the CIM MBA program. Explores current troubleshooting topics in concrete construction as it relates to selection, preconstruction communication, onsite construction activities, and post construction.

Engineering Technology

Walter Boles, Chair

(615) 898-2776

www.mtsu.edu/et/

The Department of Engineering Technology offers the Master of Science degree in Engineering Technology and concentrations in Engineering Technology as well as Occupational Health and Safety with thesis and non-thesis options.

The department also offers courses in the Master of Science in Professional Science concentration in Engineering Management. Students interested in the Engineering Management program should refer to the Master of Science in Professional Science.

Engineering Technology, Engineering Technology Concentration, M.S.

Saleh Sbenaty, Program Director

(615) 898-2966

Saleh.Sbenaty@mtsu.edu

The Department of Engineering Technology offers the Master of Science degree in Engineering Technology with concentrations in Engineering Technology as well as Occupational Health and Safety and thesis and non-thesis options. The department also offers courses in the Master of Science in Professional Science concentration in Engineering Management.

Under the Engineering Technology concentration, the degree requires the student to select courses, as approved by the graduate advisor, that provide the student with a technical area of specialty. Currently, typical technical areas include manufacturing, environmental safety, computer integrated systems, electronics, machine design, and quality control. Other technical areas or a minor can be designed to meet the student's individual needs if approved by the graduate advisor.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Successful applicants typically have a GRE quantitative score of 148 or higher and a verbal score of 143 or higher.

NOTE: *The GRE may be waived for those students who have a GPA of at least 3.00 from the MTSU Engineering Technology undergraduate program.*

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

The application deadline is April 15 for those wishing to be considered for graduate assistantships and admission in the Summer or Fall. October 1 is the application deadline for admission in the Spring. Applications will be accepted after these dates, but admission consideration is not guaranteed.

Applicant must

1. submit an application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit official scores on the Graduate Record Examination (GRE);
3. submit official transcripts of all previous college work.

Degree Requirements

The Master of Science in Engineering Technology with a concentration in Engineering Technology requires 30 hours (thesis option), with at least 21 hours at the 6000 level. The non-thesis option requires 36 hours, with at least 26 hours at the 6000 level.

Students are expected to have completed 3 semester hours of an approved research tool on the undergraduate or graduate level. Students not meeting this requirement will be expected to complete it as part of their program of study.

Students in the thesis option must complete and successfully defend a thesis (3 hours).

Students following the non-thesis option must successfully complete the research project within the required ET 6190 Six Sigma course, complete a report on the project, and present the results.

Curriculum: Engineering Technology, Engineering Technology

Candidate must complete 30 (thesis option) or 36 (non-thesis option) hours in the following course of study:

Thesis Option (30 hours)

Core Courses (18 hours)

- ET 6010 - Safety Planning **3 credit hours**
- ET 6190 - Six Sigma **3 credit hours**
- ET 6300 - PMI Project Management **3 credit hours**
- ET 6390 - Productivity Strategies/Lean Systems **3 credit hours**
- ET 6620 - Methods of Research **3 credit hours**
- ET 6710 - Current and Future Trends in Engineering and Technology **3 credit hours**

Concentration Courses (9 hours)

- ET 6720 - Innovative and Renewable Energy Sources and Technologies **3 credit hours**
- Advisor-approved electives (can include thesis research hours) **6 credit hours**

Thesis Course (3 hours)

- ET 6640 - Thesis Research **1 to 6 credit hours (3 credit hours)**

Non-thesis Option (36 hours)

Core Courses (18 hours)

- ET 6010 - Safety Planning **3 credit hours**
- ET 6190 - Six Sigma **3 credit hours**
- ET 6300 - PMI Project Management **3 credit hours**
- ET 6390 - Productivity Strategies/Lean Systems **3 credit hours**
- ET 6620 - Methods of Research **3 credit hours**
- ET 6710 - Current and Future Trends in Engineering and Technology **3 credit hours**

Concentration Course (3 hours)

- ET 6720 - Innovative and Renewable Energy Sources and Technologies **3 credit hours**

Advisor-Approved Electives (15 hours)

- Electives-Complete 15 semester hours from approved courses (could include a minor).

NOTE: The program may include a cognate in management and marketing, computer science, economics, computer information systems, or psychology.

Program Notes

Candidate must

1. file a degree plan in the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which the student intends to graduate.

Engineering Technology, Occupational Health and Safety Concentration, M.S.

Saleh Sbenaty, Program Director

(615) 898-2966

Saleh.Sbenaty@mtsu.edu

The Department of Engineering Technology offers the Master of Science degree in Engineering Technology with concentrations in Engineering Technology as well as Occupational Health and Safety and thesis and non-thesis options. The department also offers courses in the Master of Science in Professional Science concentration in Engineering Management.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Successful applicants typically have a GRE quantitative score of 148 or higher and a verbal score of 143 or higher.

NOTE: *The GRE may be waived for those students who have a GPA of at least 3.00 from the MTSU Engineering Technology undergraduate program.*

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

Applicant must

1. submit an application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit official scores on the Graduate Record Examination (GRE);
3. submit official transcripts of all previous college work.

Degree Requirements

The Master of Science in Engineering Technology with a concentration in Occupational Health and Safety requires 30 hours (thesis option), with at least 21 hours at the 6000 level. The non-thesis option requires 36 hours, with at least 26 hours at the 6000 level.

Students are expected to have completed 3 semester hours of an approved research tool on the undergraduate or graduate level. Students not meeting this requirement will be expected to complete it as part of their program of study.

Students in the thesis option must complete and successfully defend a thesis (3 hours).

Students following the non-thesis option must successfully complete the research project within the required ET 6190 Six Sigma course, complete a report on the project, and present the results.

Curriculum: Engineering Technology, Occupational Health and Safety

Candidate must complete 30 (thesis option) or 36 (non-thesis option) hours in the following course of study:

Thesis Option (30 hours)

Core Courses (18 hours)

- ET 6010 - Safety Planning **3 credit hours**
- ET 6190 - Six Sigma **3 credit hours**
- ET 6300 - PMI Project Management **3 credit hours**

- ET 6390 - Productivity Strategies/Lean Systems **3 credit hours**
- ET 6620 - Methods of Research **3 credit hours**
- ET 6710 - Current and Future Trends in Engineering and Technology **3 credit hours**

Concentration Courses (9 hours)

- ET 6020 - Safety Technology and Engineering **3 credit hours**
- ET 6040 - Occupational and Environmental Hygiene **3 credit hours**
- ET 6070 - Anthropometric Factors in Accident Prevention **3 credit hours**

Thesis Course (3 hours)

- ET 6640 - Thesis Research **1 to 6 credit hours (3 credit hours)**

Non-thesis Option (36 hours)

Core Courses (18 hours)

- ET 6010 - Safety Planning **3 credit hours**
- ET 6190 - Six Sigma **3 credit hours**
- ET 6300 - PMI Project Management **3 credit hours**
- ET 6390 - Productivity Strategies/Lean Systems **3 credit hours**
- ET 6620 - Methods of Research **3 credit hours**
- ET 6710 - Current and Future Trends in Engineering and Technology **3 credit hours**

Concentration Courses (9 hours)

- ET 6020 - Safety Technology and Engineering **3 credit hours**
- ET 6040 - Occupational and Environmental Hygiene **3 credit hours**
- ET 6070 - Anthropometric Factors in Accident Prevention **3 credit hours**

Individualized Study Course (3 hours)

- ET 6510 - Advanced Topics in Technology **3 credit hours** OR
- ET 6910 - Problems in Engineering Technology **3 credit hours**

Electives (6 hours)*

Complete 6 semester hours from approved courses.

*** The program may include a cognate of 6 hours in management and marketing, computer science, economics, computer information systems, or psychology.**

Program Notes

Candidate must

1. file a degree plan in the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which candidate intends to graduate.

Engineering Technology

ET 5230 - Advanced Machine Tool Technology 3 credit hours

Taper turning, boring and thread chasing, and calculations of screw threads and other operations. Gear terminology and calculations, practice gear cutting on the milling machine, use of index head. Two hours lecture and three hours laboratory.

ET 5330 - Advanced Computer-Aided Drafting 2 credit hours

Prerequisite: ET 3360 or CMT 3320. Interactive computer drafting and design using advanced AutoCAD software and add-ons. Primarily for students who want to increase their capabilities using CAD software and hardware. One hour lecture and three hours laboratory.

ET 5360 - Computer-Assisted Drafting and Design II 3 credit hours

Prerequisites: ET 2310 or CMT 3320. Utilizes AutoCAD software to develop skills in the creation and analysis of mechanical and architectural solid models for design and production purposes. Includes the use of shading and rendering to enhance three-dimensional model display and the extraction of two-dimensional engineering drawings. Two hours lecture and three hours laboratory.

ET 5440 - Fire Safety

3 credit hours

Possible prevention activities, fire hazards and their causes, and fire inspection techniques.

ET 5590 - Manufacturing Automation Systems

3 credit hours

Provides technical, human, and business aspects of modern automation systems. Includes automation controls, levels of control and major components/subsystems, object-based software components, intelligent actuators and sensors, emerging trends, flexible manufacturing systems (FMS), computer integrated manufacturing (CIM), industrial systems and supply chain applications, organizational approaches, and automation justification.

ET 5600 - Programmable Logic Controllers

2 credit hours

Introduces programmable logic controllers (PLCs). Selection, operation, and troubleshooting. Ladder

diagrams and programming of PLCs emphasized. One hour lecture and three hours laboratory.

ET 5610 - Instrumentation and Controls

3 credit hours

Devices and techniques used in the measurement of physical parameters. Consideration of accuracies and sources of error, identification of typical measurements, sensors and transducers, control stability, and response. Two hours lecture and three hours laboratory.

ET 5630 - Local Area Networks

3 credit hours

Foundation and experience to understand the design, implementation, and management strategies of local area networks (LAN). Data communications standards and protocol fundamentals included. Lecture, laboratory activities, and a LAN design requirement. Two hours lecture and three hours laboratory.

ET 5640 - Industrial Electricity

3 credit hours

AC power theory and circuits for industrial applications, polyphase systems, power factor correction, and transformers. Theory, applications, and selection of motors and generators. Control subsystems with emphasis on power electronics. Two hours lecture and three hours laboratory.

ET 5650 - Introduction to Microprocessors

3 credit hours

Prerequisite: ET 3620. Introductory course in microprocessor-based systems and their related components. Machine language programming extensively used to solve problems and to demonstrate the relationship of the microprocessor to its supporting peripherals. Basic microcomputer architecture also emphasized. Two hours lecture and three hours laboratory.

ET 5660 - Microprocessor Interfacing

3 credit hours

Analog and digital conversion devices and their related systems. Introduction to individual subsystems; A/D and D/A data conversion. Organization and design of individual digital systems emphasized. Includes data transfer, conversion, storage, input and output with principal focus on systems external to computer systems. Two hours lecture and three hours laboratory.

ET 5670 - Microprocessor Design**3 credit hours**

Advanced course in design and application of microprocessor-based microcomputers for measurement and control systems. In-depth analysis of software and hardware in the design process.

Design, develop, and test an operating system for a microprocessor-based computer. Two hours lecture and three hours laboratory.

ET 5710 - Industrial Seminar**1 credit hours**

Orientation to industrial job opportunities, placement practices, interview techniques, and preparation of application materials (resume, cover letter). Guest lectures, films, and student and faculty presentations.

ET 5850 - Fluid Power**3 credit hours**

Systems and the basic components that make up these systems, including hydraulic, pneumatic, and fluidic. Emphasis on understanding the language and graphic symbols associated with fluid power and the performance characteristics of system components.

Two hours lecture and three hours laboratory.

ET 5860 - Robotics**3 credit hours**

Introduces the fundamentals of robots. Types of robots and controls, the prime movers, and the application of robots in the industrial environment.

Two hours lecture and three hours laboratory.

ET 5915 - Technical Project Management and Soft Skills**3 credit hours**

Prerequisite: Graduate standing. Project management as sanctioned by the International Project Management Institute and how to assess and boost emotional intelligence or soft skills. Student successfully completing course will earn 20 Professional Development Units (PDUs) issued by the International Project Management Institute.

ET 5970 - Engineering Economy**3 credit hours**

Development of capital budgets; justification of capital projects using time value of money concepts; replacement analysis. Review of justification of actual capital projects and computer applications.

ET 5990 - Industrial Engineering Systems**3 credit hours**

System design of work tasks including establishing time standards by time and motion study and work sampling; ergonomic design for integration of the human into the work task environment. Scientific methods supplemented by quality considerations with emphasis on statistical quality control (SQC).

Computer software used for design and analyses.

Graduate students will lead an industry design project team of students.

ET 6010 - Safety Planning**3 credit hours**

Advanced study of planning in occupational safety and health management, including program planning and development methods and techniques as well as various systems approaches to hazard control.

ET 6020 - Safety Technology and Engineering**3 credit hours**

Advanced study of the technical components of occupational workplace hazards, hazards analysis, workplace design, current regulatory requirements, engineering techniques for hazard control, personal protective systems, equipment and techniques.

Includes a practical application problem of hazard analysis and control.

ET 6040 - Occupational and Environmental Hygiene**3 credit hours**

An advanced quantitative study of occupational and environmental health principles, practices, and sampling techniques as required by either consensus or regulatory standards and their specific protocols to protect both workers and the public.

ET 6070 - Anthropometric Factors in Accident Prevention**3 credit hours**

The necessity and desirability of a thorough consideration of anthropometric factors when designing facilities and equipment and recognition of those factors most prevalent in accidents.

ET 6190 - Six Sigma**3 credit hours**

Prerequisite: MATH 1530 or equivalent or consent of instructor. The Six Sigma methodology is defined as a comprehensive and flexible system for achieving, sustaining, and maximizing business success.

Through class instruction, simulations, and hands-on

projects, students will be able to identify and focus on customers' critical-to-quality (CTQ) characteristics and solve problems using the define, measure, analyze, improve, and control (DMAIC) process and its associated tools. A Green Belt certification will be awarded upon successful completion of an industry/business Green Belt project.

ET 6230 - Advanced Technical Drafting
3 credit hours

Current trends and techniques such as using computers to solve design problems and the use of group suggestions (brainstorming) in solving design problems.

ET 6260 - Advanced Technical Problems in Electricity and Electronics
3 credit hours

In-depth insight into the practical applications of electronic theory. Students required to design and develop electrical/electronic applications of an advanced nature.

ET 6300 - PMI Project Management
3 credit hours

Prerequisite: Graduate standing. Project management processes and knowledge areas as sanctioned by the International Project Management Institute (PMI). Successful completion of the course will earn 23 contact hours/professional development units (PDUs) issued by PMI.

ET 6390 - Productivity Strategies/Lean Systems
3 credit hours

Prerequisites: Graduate standing and ET 3910 or consent of instructor. Topics include the human element (supervisory and teamwork skills), the theoretical aspect (laws and science covering service and production systems), and the practical aspect (tools for lean operational systems implementation). Theoretical and practical methods needed to complete a required industry/business project and obtain a certification in Lean Manufacturing.

ET 6510 - Advanced Topics in Technology
3 credit hours

Independent investigation and report of current problems of particular interest to individual students directed by department faculty members.

ET 6520 - Advanced Topics in Technology
3 credit hours

Independent investigation and report of current

problems of particular interest to individual students directed by department faculty members.

ET 6620 - Methods of Research
3 credit hours

Introduces Master of Science students to scholarly research principles and to thesis formats for research reporting. A problem is researched and written up in thesis proposal format.

ET 6640 - Thesis Research
1 to 6 credit hours

Prerequisite: ET 6620. Selection of a research problem, review of pertinent literature, collection and analysis of data, and composition of thesis. Once enrolled, student should register for at least one credit hour of master's research each semester until completion. S/U grading.

ET 6650 - Embedded Microprocessor Design
3 credit hours

Prerequisite ET 4660 or consent of instructor. Topics include basics of embedded microprocessor systems, introduction to field programmable gate arrays (FPGA), integrated software environment (ISE), embedded development kit (EDK) CAD software, and the architecture and features of the MicroBlaze soft-core. Two hours lecture and three hours laboratory.

ET 6700 - Analytical Methods in Engineering Technology
3 credit hours

Prerequisites: MATH 1530, 1910, and 1920; graduate standing. Survey of essential mathematical skills and their applications in engineering technology. Applications of algebra, calculus, differential equations, linear algebra, numerical analysis, data analysis, statistics, vector analysis, and other topics with specific reference to concepts in an engineering technology curriculum. Symbolic mathematical computer software will be used throughout the course.

ET 6710 - Current and Future Trends in Engineering and Technology
3 credit hours

Prerequisite: Graduate standing. The latest advancements and practices in various engineering and technology fields. Selected topics may include computers and electronics, networking and telecommunication, instrumentation, lasers, automation and robotics, manufacturing and rapid prototyping, bioengineering and biotechnology, and

renewable energy sources. Takes a student-centered, hands-on learning approach and focuses on understanding new technologies and how technology is used in the industry. Research projects will provide appropriate experience and accommodate individual's interest.

ET 6720 - Innovative and Renewable Energy Sources and Technologies

3 credit hours

Prerequisite: Graduate standing. In-depth coverage of current and future renewable energy sources and energy conversion technologies and efficiency and storage technologies. Environmental, economic, and security impacts are covered.

ET 6730 - Process Control

3 credit hours

Prerequisites: MATH 1910 and ET 3602 or equivalent. Basic process control concepts and theory. Analog and digital signal conditioning. Sensors and controllers. Controller principles and control-loop characteristics. Process control applications.

ET 6740 - Engineering Technology Internship

3 credit hours

Opportunity for students to gain practical experience in their particular field of interest within the engineering technology or occupational health and safety industries. Student will be evaluated by graduate faculty (with input from his/her supervisor) and a final report will be submitted by the student detailing the internship experience.

ET 6810 - Engineering Management Theory and Application

3 credit hours

Prerequisite: Graduate standing. Theories, concepts, and applications from the engineering management body of knowledge (EMBOK) for technical, healthcare, and service industries. EMBOK topics covered defined in the American Society for Engineering Management (ASEM) Guide to the EMBOK and include leadership in technical, healthcare, and service industries; strategic planning in a technical environment; financial resource management in the technical environment; technical project management; operations and supply chain management; technical managers' role in marketing and sales; legal issues in engineering management; professional ethics and responsibilities in a technical environment; product and process development;

systems engineering; technical management of research and development; and sustainability engineering.

ET 6870 - Engineering Management Systems

3 credit hours

Prerequisite: Graduate standing. Advanced topics related to engineering management systems with a focus on innovation implementation for technical products, technical processes, and for business models in a technical environment. Implementation strategies integrating current and emerging technologies into manufacturing, health care and service industries. Components needed for the construction of new venture business plans to create new technology businesses and jobs.

ET 6910 - Problems in Engineering Technology

3 credit hours

Independent investigation and report of a problem in engineering technology. Designed to meet the particular needs of the students; pursued under the direction of a department faculty member.

ET 6920 - Problems in Engineering Technology

3 credit hours

Independent investigation and report of a problem in engineering technology. Designed to meet the particular needs of the students; pursued under the direction of a department faculty member.

ET 6999 - Comprehensive Examination and Preparation

1 credit hours

Open only to students who are not enrolled in any other graduate course and who will take the master's comprehensive examination during the term. Student must contact graduate advisor during the first two weeks of the term for specifics regarding the details of this comprehensive examination preparatory course. Credit may not be applied to degree requirements.

Environmental Science and Technology

EST 5770 - Pollution Control Technology

3 credit hours

Introduces air, noise, solid waste, and water pollution control technology. Legislative regulations and equality standards, pollution types and sources, detection and analysis instruments, and treatment principles and practices.

EST 5780 - Air, Solids, and Noise Pollution Technology

3 credit hours

Prerequisites: 8 hours each chemistry, biology, and physics or permission of instructor. Introduces air, noise, solid, and hazardous waste pollution technology, including legislative regulations and quality standards: sources, detection, and analysis instrumentation and practices, and treatment and abatement principles, equipment, and practices.

EST 5810 - Energy and the Environment

3 credit hours

Introduces sources and methods of energy production and classifications of energy usages with emphasis on usage trends, energy conservation strategies, and alternate energy utilization.

EST 5820 - Solar Building Design

3 credit hours

Introduces environmental and economic impact of solar energy for residential and light industrial construction including topics such as day lighting, passive solar design, and hot water heating.

EST 5840 - Energy Auditing

3 credit hours

Introduces types of energy consumption and classifications of energy usages. Emphasis on conservation strategies and total management for residential and industrial plants.

EST 5870 - Passive Solar Design

3 credit hours

Introduces passive solar techniques in the construction of residential and light industrial structures. Includes day lighting, passive solar design, methods, and system integration.

EST 5980 - Environmental Public Health

3 credit hours

Prerequisites: 8 hours college biology and 8 hours college chemistry. Applying the sciences of biology, chemistry, statistics, and environmental engineering to the field of public health. Public health epidemiology and disease control concepts related to the anticipation, recognition, assessment, and control of common public health disease problems.

Geosciences

Warner Cribb, Chair

(615) 898-2726

www.mtsu.edu/geosciences/

The Department of Geosciences offers a concentration in Geosciences within the Master of Science in Professional Science and minors in Physical Geography and Earth Science/Geology at the graduate level.

NOTE: Some physical geography and/or geology courses may be accepted as either physical geography or geology; others are accepted only in one discipline. Substitutions are made at the discretion of department chair in consultation with the academic minor advisor.

Earth Science/Geology Minor

There are two patterns of minors from which a candidate may choose:

1. A single minor consisting of at least 12 semester hours; 12 undergraduate hours in an area are prerequisite to a single minor in that area at the master's level.
2. A minor consisting of a minimum of 6 semester hours in each of two subjects. The candidate is expected to complete the total program in the major, minor, and/or cognate fields. A cognate is defined as 6 semester hours.

Physical Geography Minor

There are two patterns of minors from which a candidate may choose:

1. A single minor consisting of at least 12 semester hours; 12 undergraduate hours in an area are prerequisite to a single minor in that area at the master's level.
2. A minor consisting of a minimum of 6 semester hours in each of two subjects. The candidate is expected to complete the total program in the major, minor, and/or cognate fields. A cognate is defined as 6 semester hours.

Geology

GEOL 5000 - Petrology and Petrography

4 credit hours

Prerequisite: GEOL 3000. Igneous, sedimentary, and metamorphic rocks. Theories of formation and evolution based upon mineralogical and geochemical evidence. Examination and classification of rocks in hand sample and thin section. Additional assignments involving data analysis and interpretation and completion of a research paper required for graduate credit. Lecture and laboratory.

GEOL 5020 - Geomorphic Regions of the United States

4 credit hours

Prerequisite: GEOL 1030/1031 or 1040/1041. The origin, regional distribution, and geomorphic features and history of the landforms of the United States. Students required to analyze maps, structure sections, and aerial photography to determine geomorphic form and the forces and processes that produced these forms plus research a geomorphic problem resulting in a thesis-type paper. Three hours lecture and two hours laboratory per week.

GEOL 5030 - Invertebrate Micropaleontology

4 credit hours

Prerequisite: GEOL 1050. Invertebrate and microscopic animal life of the past including recent preserved representatives and their ancient fossilized ancestors. Numerous field trips to local fossil-collecting sites. Designed to aid in the preparation of earth science teachers, geologists, and biologists. Research paper on a topic approved by instructor. An oral presentation of this material may be required. Lecture and laboratory

GEOL 5040 - Engineering Geology

3 credit hours

Prerequisites: GEOL 1030/1031 or GEOL 1040/1041 or equivalent; MATH 1720 and MATH 1710 or MATH 1730. Principles and applications of geology in engineering practice. Engineering geology exploration, behavior of soils and rocks for engineering projects, application of engineering geology to the solution of construction and environmental problems. Three hours lecture per week.

GEOL 5050 - Meteorology

3 credit hours

Physical laws as they relate to the atmosphere,

atmospheric processes and their effects on air masses, fronts, and atmospheric circulation, the dynamics of the atmosphere and its relationship to the hydrosphere. Special problem to be assigned by the instructor.

GEOL 5060 - Principles of Geoscience

4 credit hours

Includes topics from geology, astronomy, meteorology, and oceanography. Specifically designed to aid in the preparation of earth science teachers in the public schools. Term paper on topic approved by the instructor. Three hours lecture and two hours laboratory per week.

GEOL 5070 - Sedimentation and Stratigraphy

4 credit hours

Prerequisites: GEOL 1050 and 3000 or consent of instructor. Sedimentary rocks; the processes of sedimentation, the alteration of sediments through time, and an examination of the resulting stratigraphic units. For geoscience majors and those with interests in soil mechanics and civil engineering. Research paper on a topic approved by the instructor. An oral presentation may also be required. Lecture and laboratory.

GEOL 5080 - Structural Geology

3 credit hours

Prerequisites: MATH 1720 or MATH 1730; GEOL 1030/1031 or 1040/1041; GEOL 3040. Orientation and deformation of rock. Geometric, analytical, and statistical solutions to structural problems. Emphasis on three-dimensional visualization, problem solving, geological map interpretation, and the mechanics of deformation. Case analyzing, research, and interpretation required. Lecture and laboratory.

GEOL 5090 - Problems in Geology

1 to 6 credit hours

Prerequisite: A minimum of 12 semester hours of geology, at least 6 hours of which must be upper division and excluding GEOL 1030/1031 or by consent of instructor. An independent research-oriented project commensurate with the student's interests and qualifications. In-depth research requiring extensive and intensive search of applicable literature and large study area. An oral examination and discussion required. May be repeated up to a maximum of six hours.

GEOL 5100 - Geophysical Prospecting**4 credit hours**

Prerequisites: MATH 1910, PHYS 2010/2011 or 2110/2111, or consent of instructor. PHYS 2020/2021 or 2120/2121, GEOL 1030/1031 or 1040/1041, and MATH 1920 also recommended. Survey of seismic, gravimetric, and magnetic/electrical exploration methods. Applied course covering some elementary theory, basic field practice, computation fundamentals, interpretation techniques. Case analysis, research, and interpretation required. Two-hour lecture and two hours laboratory per week.

GEOL 5120 - Environmental Geology**4 credit hours**

Prerequisite: GEOL 1030/1031 or 1040/1041 or PGEO 1030 or consent of instructor. Application of geologic information to minimize possible environmental degradation and maximize utilization of resources in the natural and modified environment, local examples and field trips. Topics include engineering properties of earth materials, natural hazard prediction and reduction, water supply, solid and hazardous wastes, mineral resources, global change, land-use planning, environmental impact analysis. Three hours lecture and two hours laboratory per week. An in-depth research project and paper required.

GEOL 5130 - Hydrogeology**5 credit hours**

Prerequisites: MATH 1720 or MATH 1730; GEOL 1030/1031 or 1040/1041; GEOL 1050; or consent of instructor. Basic processes and measurement of the hydrologic cycle, including precipitation, evaporation, surface runoff, stream flow, soil moisture, and ground water. Emphasis placed on ground water, including geology of occurrence, principles of flow, conceptual models of regional flow, chemistry and quality, well hydraulics, aquifer characteristics, resource development, detection of pollutants, and contaminant transport. Additional individual research project required, including a written and classroom report. Lecture and laboratory.

GEOL 5140 - Inorganic Geochemistry**3 credit hours**

Prerequisite: GEOL 3000. Principles of inorganic geochemistry. Geochemistry of the earth and solar system, isotope geochronometers, thermodynamics of geochemical processes, mineral stability diagrams, isotope fractionation, rates of geochemical processes, chemical weathering, chemical compositions of surface and groundwater, geochemical exploration,

geochemical cycles, environmental geochemistry. Additional assignments involving data analysis and interpretation and completion of a research paper required for graduate credit. Three-hour lecture per week.

GEOL 5150 - Environmental Applications of Hydrogeology**3 credit hours**

Prerequisite: GEOL 4130 or GEOL 5130. Advanced course that emphasizes applied methods for assessing hazardous and solid waste facilities and contaminated ground water remediation techniques. Included will be site characterization methods, ground water sampling procedures, and monitoring well installation techniques. Additional assignments involving case history analysis with an oral presentation will be required of graduate students. Three hours lecture per week.

GEOL 5401 - Field Course**4 credit hours**

Supervised study in some geological area preceded by classroom preview and concluded by a time of evaluation. Emphasis on the natural and physical elements of the environment, with special attention directed toward the geomorphology and geology of scientific areas. An intensive period of study and research on a full-time basis. Work required will depend on area researched and time involved. Consult department chair for specific fees.

GEOL 5402 - Field Course**4 credit hours**

Supervised study in some geological area preceded by classroom preview and concluded by a time of evaluation. Emphasis on the natural and physical elements of the environment, with special attention directed toward the geomorphology and geology of scientific areas. An intensive period of study and research on a full-time basis. Work required will depend on area researched and time involved. Consult department chair for specific fees.

GEOL 6000 - Environmental Geosystems**3 credit hours**

Corequisite: Graduate standing in Geosciences or permission of department. Principles of environmental geosystems. The role of geologic processes in natural and human-induced distribution of contaminants in minerals, rocks, soils, surface water, and groundwater. Detection, measurement, and

remediation of human impacts on geologic environments. Three hours lecture per week.

GEOL 6010 - Case Studies in Environmental Geosystems

3 credit hours

Prerequisite: GEOL 6000. Environmental geosystem case studies involving natural and human-induced distribution of contaminants in minerals, rocks, soils, surface water, and groundwater and the detection, measurement, and remediation of contaminants in geologic environments. Three hours lecture per week.

GEOL 6020 - Advanced Hydrogeology

3 credit hours

Prerequisite: GEOL 4130 or GEOL 5130. Advanced principles and the applications of hydrogeologic modeling techniques used to investigate and remediate contaminated groundwater. Three hours lecture per week.

GEOL 6030 - Geosciences Colloquium

2 credit hours

Prerequisite: GEOL 1030/1031 or GEOL 1040/1041, or equivalent. A discussion of current issues in geosciences led by guest speakers, MTSU faculty members, and graduate students.

Physical Geography

PGEO 5000 - Climatology and Climate Change

3 credit hours

Prerequisite: PGEO 1030 or GEOL 1030/1031 or GEOL 1040/1041. Non-mathematical introduction to the causes and patterns of global climates and in-depth analysis of climate change, including paleoclimatology and recent global cooling and warming trends, their natural and human-induced causes, potential future trends, human and environmental adaptation, and mitigation including geoengineering.

PGEO 5010 - Biogeography

3 credit hours

Prerequisite: PGEO 1030 or GEOL 1030/1031 or GEOL 1040/1041. Examines the science of biogeography, geographic principles, and foundations of biogeography. Topics include patterns of biodiversity, ecological biogeography, specialization and extinction forces, and the frontiers of biogeography.

PGEO 5020 - Environmental Issues, Impacts, and Sustainability

3 credit hours

Prerequisite: PGEO 1030 or GEOL 1030/GEOL 1031 or GEOL 1040/GEOL 1041. Examines the geographic aspects of how locations affect such modern issues of air and water pollution, hazardous waste, climate change, and food production. Provides an overview of the modern environmental concerns, their causes, consequences, and factors needing to be examined in order to gain an understanding of these problems.

PGEO 5280 - Special Problems and Topics in Physical Geography

1 to 6 credit hours

Research participation or guided readings in a particular area or topic appropriate to the student's interests and professional objectives. The type and amount of additional work will be decided upon when student registers for the course.

PGEO 5380 - Cartography

4 credit hours

General knowledge of the field including familiarity with the techniques and tools of professional cartography and graphics. Selected lectures and class discussions. A series of map construction assignments; a specialized map assignment supported by written analysis. Three hours lecture and one two-hour laboratory per week.

PGEO 5401 - Field Studies in Physical Geography

4 credit hours

Supervised study in some geographical area, preceded by classroom preview and concluded by a time of evaluation. Emphasis on the natural and cultural elements of the environment, with special attention directed toward the pattern of human occupancy. An intensive period of study and research on a full-time basis. Work required will depend on area researched and time involved. Consult department chair for specific fees.

PGEO 5490 - Remote Sensing

4 credit hours

Various vehicles of remote sensing such as radar, satellite imagery, and infrared data. Use of data in preparation of maps and applications to land use and environmental problems examined. Selection of data from either a numeric or image remote sensing system, interpreting, and developing a report from the interpretations. Three hours lecture and one two-hour laboratory per week.

PGEO 5510 - Laboratory Problems in Remote Sensing

4 credit hours

Prerequisite: PGEO 4490 or PGEO 5490. Computer processing of selected satellite imagery. Laboratory will provide practical experience through design, execution, and completion of applied remote sensing projects, one of which will be the effects of an environmental impact.

PGEO 5511 - Advanced Remote Sensing

3 credit hours

Prerequisite: PGEO 5490 or PGEO 4490. Lecture and laboratory in the study of advanced topics in remote sensing, including but not limited to, active sensors (LiDAR and RADAR), hyperspectral, and spectroscopy. Three hours lecture/laboratory per week.

PGEO 5520 - Image Interpretation

4 credit hours

Principles, methods, and techniques of image interpretation including maps, satellite data, and aerial photos. Environmental impact of a special project. Three hours lecture and one two-hour laboratory per week.

PGEO 5530 - Geographic Information Systems

4 credit hours

Lecture and laboratory work relative to computer-manipulated geographic data base. Laboratory work will involve experience in practical application of a geographic information system (GIS) to problem-solving. Student will take appropriate data and compile an environmental impact statement (EIS). Three hours lecture and two hours laboratory per week.

PGEO 5560 - Intermediate Geographic Information Systems

3 credit hours

Prerequisite: PGEO 4530 or PGEO 5530. Lecture and laboratory work related to the principles and applications of geographic information systems (GIS). Continued training in GIS analysis including raster analysis, spatial analysis, network analysis, and geocoding. Data management including data editing, geodatabase design, and creation also examined. Other topics include resource management, demographic, and civic application. Three hours lecture per week.

PGEO 5570 - Advanced Geographic Information Systems

3 credit hours

Prerequisite: PGEO 4560 or PGEO 5560. Use of geographic information systems, computer programming, and database operations to analyze geodata. Study of geographic areas recently modified by natural or human phenomena to acquire relevant data, use appropriate spatial statistics, and make inferences about the transformative process and/or the future state of the study area. Presentation of findings in both map and report form. Three hours lecture per week.

PGEO 6040 - Geospatial Systems and Applications

4 credit hours

Evaluate integrated environmental systems and physical processes in landscapes through application of GIS technology. Make spatial inferences about transformative processes and past/future state of the study area. Describe techniques required to complete environmental studies at multiple scales involving geospatial datasets.

PGEO 6050 - Programming for Geospatial Database Applications

3 credit hours

Prerequisite: PGEO 5570. Development of custom/tailored GIS-based computer programming to analyze geospatial datasets for making inferences about the Earth's natural and human systems. Extend commercially available geographic information systems software packages through the development of novel computer programs to perform GIS tasks such as spatial analysis, data transformation, map generation, and geospatial database integration.

PGEO 6060 - Advanced Topics in Geosciences

1 to 3 credit hours

Individual-based study/research in particular area or field of Geosciences related to student's interest and professional objectives. May be repeated once, up to a maximum of six credits.

PGEO 6070 - Quantitative Methods in Geosciences

3 credit hours

Applies computational technology to solve practical problems in geology and physical geography fields using statistical and data analysis methods to describe, analyze, transform, and utilize geospatial datasets. Processing, summarizing, graphical

visualization, and spatial inferences about transformative processes and past/future state of natural environment phenomena.

Mathematical Sciences

Donald A. Nelson, Chair

(615) 898-2669

www.mtsu.edu/math/

The Department of Mathematical Sciences offers the Master of Science with a major in Mathematics, the Master of Science in Teaching with a major in Mathematics, and a minor in Mathematics at the graduate level.

Three concentrations are offered under the Master of Science: General Mathematics (students desiring a broad background in mathematics should pursue this concentration); Industrial Mathematics (students interested in positions in industry or further graduate work in applied mathematics should pursue this concentration), and Research Preparation (students wishing to pursue the Ph.D. in Mathematics should choose this concentration).

Two concentrations are offered under the Master of Science in Teaching: Middle Grade Mathematics and Secondary Mathematics.

The department also offers courses in the Master of Science in Professional Science degree. Students interested in a concentration in Biostatistics or Actuarial Sciences should refer to the Master's of Science in Professional Science program.

The department also offers an Accelerated Bachelor's/Master's (ABM) program. Students in the Mathematics ABM are able to earn a bachelor's degree and a master's degree in five (5) years. Students interested in this program should contact the department for additional information.

Mathematics Minor

There are two patterns of minors from which a candidate may choose:

1. A single minor consisting of at least 12 semester hours; 12 undergraduate hours in an area are prerequisite to a single minor in that area at the master's level.
2. A minor consisting of a minimum of 6 semester hours in each of two subjects. The candidate is expected to complete the total program in the major, minor, and/or cognate fields. A cognate is defined as 6 semester hours.

Mathematics, General Mathematics Concentration, M.S.

James Hart, Program Director

(615) 898-2402

James.Hart@mtsu.edu

The Department of Mathematical Sciences offers the Master of Science with a major in Mathematics, the Master of Science in Teaching with a major in Mathematics, and a minor in Mathematics at the graduate level.

Three concentrations are offered under the Master of Science: General Mathematics (students desiring a broad background in mathematics should pursue this concentration); Industrial Mathematics (students interested in positions in industry or further graduate work in applied mathematics should pursue this concentration); and Research Preparation (students wishing to pursue the Ph.D. in Mathematics should choose this concentration).

Two concentrations are offered under the Master of Science in Teaching: Middle Grade Mathematics and Secondary Mathematics.

The department also offers courses in the Master of Science in Professional Science degree. Students interested in a concentration in Biostatistics or in Actuarial Sciences should refer to the Master's of Science in Professional Science program.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admission normally requires completion of the GRE or MAT with acceptable scores. (Successful applicants typically have combined GRE scores of 291 [current scale] or 900 [former scale] or above or MAT scores of 402 or greater.)

Applicant must

1. have earned a bachelor's degree from an accredited university or college;
2. have an acceptable grade point average for all college work taken;
3. have completed 21 semester hours of college-level mathematics (including calculus), with at least 9 hours of mathematics beyond calculus.

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

Applicant must

1. submit application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit official scores on the GRE or MAT;
3. submit official transcripts of all previous college work.
4. two letters of recommendation are also recommended, but not required.

Degree Requirements

The Master of Science in Mathematics with a concentration in General Mathematics requires completion of 36 hours consisting of a 9-hour core, 18 hours in the concentration, and a 9-hour cognate approved by the advisor.

Candidate must

1. participate in the graduate seminar and give an oral presentation of an approved topic;
2. successfully complete a master's thesis or a written comprehensive examination (may be taken no more than twice);
3. take two additional one-hour comprehensive exams over courses of their choosing if not completing a thesis.

Curriculum: Mathematics, General Mathematics Concentration

Candidate must complete 36 hours in the following course of study:

Core Courses (9 hours)

- MATH 6120 - Advanced Linear Algebra **3 credit hours**
- MATH 6170 - Sets and Logic **3 credit hours**
- MATH 6190 - Analysis I **3 credit hours**

Concentration Courses (18 hours)

Eighteen (18) hours from approved courses in mathematical sciences including at least one course from each of three different groups:

Actuarial and Financial Mathematics:

- ACSI 5200 - Introduction to Mathematics of Investment **3 credit hours** OR
- MATH 5200 - Introduction to Mathematics of Investment **3 credit hours**
- ACSI 5330 - Actuarial Mathematics I **3 credit hours**
- ACSI 5340 - Actuarial Mathematics II **3 credit hours**
- ACSI 5630 - Mathematics of Risk Management **3 credit hours**
- ACSI 5640 - Mathematics of Options, Futures, and Other Derivatives **3 credit hours**
- ACSI 6010 - Credibility Theory and Loss Distributions **3 credit hours**
- MATH 6603 - Problems in Mathematics-Mathematics of Finance **1 to 9 credit hours**
- MATH 6604 - Problems in Mathematics-Mathematics of Life Contingencies **1 to 9 credit hours**

Algebra/Number Theory:

- MATH 5420 - Number Theory **3 credit hours**
- MATH 5530 - Abstract Algebra II **3 credit hours**
- MATH 6140 - Selected Topics of Modern Mathematics: Algebra **3 credit hours**
- MATH 6510 - Advanced Algebra **3 credit hours**

Analysis:

- MATH 6141 - Selected Topics of Modern Mathematics: Analysis **3 credit hours**
- MATH 6200 - Analysis II **3 credit hours**
- MATH 6210 - Complex Variables **3 credit hours**
- MATH 6250 - Real Analysis **3 credit hours**

Combinatorics/Graph Theory:

- MATH 5700 - Combinatorics and Graph Theory **3 credit hours**
- MATH 6700 - Advanced Combinatorics and Graph Theory **3 credit hours**

Geometry/Topology:

- MATH 5270 - Introduction to Topology **3 credit hours**

- MATH 6142 - Selected Topics in Modern Mathematics: Topology **3 credit hours**
- MATH 6400 - Advanced Geometry **3 credit hours**

Industrial Mathematics:

- MATH 5310 - Numerical Analysis I **3 credit hours**
- MATH 5320 - Numerical Analysis II **3 credit hours**
- MATH 6260 - Advanced Differential Equations I **3 credit hours**
- MATH 6270 - Advanced Differential Equations II **3 credit hours**
- MATH 6300 - Optimization **3 credit hours**
- MATH 6310 - Control Theory **3 credit hours**

Statistics:

- STAT 5200 - Statistical Methods for Forecasting **3 credit hours**
- STAT 5320 - Probability and Stochastic Processes **3 credit hours**
- STAT 5360 - Regression Analysis **3 credit hours**
- STAT 5370 - Nonparametric Statistics **3 credit hours**
- STAT 5380 - Experimental Design **3 credit hours**
- STAT 6160 - Advanced Mathematical Statistics I **3 credit hours**
- STAT 6180 - Advanced Mathematical Statistics II **3 credit hours**
- STAT 6602 - Problems in Statistics-Regression Analysis **3 credit hours**
- STAT 6603 - Problems in Statistics-Nonparametric Statistics **3 credit hours**
- STAT 6604 - Problems in Statistics-Experimental Design **3 credit hours**

Cognate (9 hours)

Nine (9) additional hours approved by advisor. The master's thesis is an option in this concentration. See MATH 6640 Thesis Research (1 to 6 credits).

Program Notes

Candidate must

1. file a degree plan in the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which candidate intends to graduate.

Mathematics, Industrial Mathematics Concentration, M.S.

James Hart, Program Director

(615) 898-2402

James.Hart@mtsu.edu

The Department of Mathematical Sciences offers the Master of Science with a major in Mathematics, the Master of Science in Teaching with a major in Mathematics, and a minor in Mathematics at the graduate level.

Three concentrations are offered under the Master of Science: General Mathematics (students desiring a broad background in mathematics should pursue this concentration); Industrial Mathematics (students interested in positions in industry or further graduate work in applied mathematics should pursue this concentration); and Research Preparation (students wishing to pursue the Ph.D. in Mathematics should choose this concentration).

Two concentrations are offered under the Master of Science in Teaching: Middle Grade Mathematics and Secondary Mathematics.

The department also offers courses in the Master of Science in Professional Science degree. Students interested in a concentration in Biostatistics or in Actuarial Sciences should refer to the Master's of Science in Professional Science program.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admission normally requires completion of the GRE or MAT with acceptable scores. (Successful applicants typically have combined GRE scores of 291 [current scale] or 900 [former scale] or above or MAT scores of 402 or greater.)

Applicant must

1. have earned a bachelor's degree from an accredited university or college;
2. have an acceptable grade point average for all college work taken;
3. have completed 21 semester hours of college-level mathematics (including calculus), with at least 9 hours of mathematics beyond calculus.

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

Applicant must

1. submit application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit official scores on the GRE or MAT;
3. submit official transcripts of all previous college work;
4. two letters of recommendation are recommended, but not required

Degree Requirements

The Master of Science in Mathematics with a concentration in Industrial Mathematics requires completion of 36 hours of graduate courses consisting of a 9-hour core, 18 hours in the concentration, and a 9-hour cognate approved by the advisor.

Candidate must

1. participate in the graduate seminar and give an oral presentation of an approved topic;
2. successfully complete a master's thesis or a written comprehensive examination (may be taken no more than twice);
3. students who opt not to write an MS thesis must take two additional one-hour comprehensive exams over courses of their choosing.

Curriculum: Mathematics, Industrial Mathematics

Students interested in positions in industry or further graduate work in applied mathematics should pursue this concentration. In addition to the core, students must complete the concentration and a cognate (36 hours) as outlined below:

Core (9 hours)

- MATH 6120 - Advanced Linear Algebra **3 credit hours**
- MATH 6170 - Sets and Logic **3 credit hours**
- MATH 6190 - Analysis I **3 credit hours**

Concentration (18 hours)

Eighteen (18) hours including

- MATH 5310 - Numerical Analysis I **3 credit hours**
- MATH 5320 - Numerical Analysis II **3 credit hours**
- MATH 6260 - Advanced Differential Equations I **3 credit hours**
- MATH 6270 - Advanced Differential Equations II **3 credit hours**

plus two courses from

- MATH 6210 - Complex Variables **3 credit hours**
- MATH 6300 - Optimization **3 credit hours**
- MATH 6310 - Control Theory **3 credit hours**
- MATH 6400 - Advanced Geometry **3 credit hours**
- STAT 6180 - Advanced Mathematical Statistics II **3 credit hours**
- MATH 6700 - Advanced Combinatorics and Graph Theory **3 credit hours** OR
- STAT 6160 - Advanced Mathematical Statistics I **3 credit hours**

Cognate (9 hours)

Nine (9) additional hours chosen from the above list; MATH 6640, and/or courses from relevant disciplines approved by advisor. The master's thesis is an option in this concentration. See MATH 6640 Thesis Research (1 to 6 credits).

Program Notes

Candidate must

1. file a degree plan in the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which candidate intends to graduate.

Mathematics, Middle Grade Mathematics Concentration, M.S.T.

Michaele Chappell, M.S.T. Program Director

(615) 898-2393

Michaele.Chappell@mtsu.edu

The Department of Mathematical Sciences offers the Master of Science with a major in Mathematics, the Master of Science in Teaching with a major in Mathematics, and a minor in Mathematics at the graduate level.

Three concentrations are offered under the Master of Science: General Mathematics, Industrial Mathematics, and Research Preparation. For those interested in teaching, two concentrations are offered under the Master of Science in Teaching: Middle Grade Mathematics and Secondary Mathematics.

The department also offers courses in the Master of Science in Professional Science degree. Students interested in a concentration in Biostatistics or in Actuarial Sciences should refer to the Master's of Science in Professional Science program.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admission to the Master of Science in Teaching with a concentration in Middle Grade Mathematics program requires

1. an earned bachelor's degree from an accredited university or college;
2. an acceptable grade point average for all college work taken;
3. a valid elementary teaching certificate;
4. completion of the GRE or MAT with acceptable scores (MAT score generally expected to meet or exceed 402).

NOTE: Any candidate not meeting these requirements may petition to the Mathematics Education Graduate Admissions Committee.

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

Applicant must

1. submit application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit official scores on the GRE or MAT;
3. submit official transcripts of all previous college work;
4. submit two letters of recommendation.

Degree Requirements

Candidate must

1. complete 36 hours of graduate courses (see Curriculum section below for specifics);
2. successfully complete a comprehensive examination (may be taken no more than twice).

Curriculum: Mathematics, Middle Grade Mathematics

Candidate must complete 36 hours in the following course of study:

Required Core Courses (9 hours)

- MATH 6320 - Mathematical Problem Solving **3 credit hours**
- MATH 6380 - Current Trends in Mathematics Education **3 credit hours**
- MATH 6900 - Research in Mathematics Education **3 credit hours**

Concentration (15 hours)

Selected from:

- MATH 5620 - History and Philosophy of Mathematics **3 credit hours**
- MATH 6100 - Mathematics for Teachers **3 credit hours**
- MATH 6330 - Algebra from an Advanced Perspective **3 credit hours**
- MATH 6340 - Geometry from an Advanced Perspective **3 credit hours**
- MATH 6350 - Probability and Statistics from an Advanced Perspective **3 credit hours**
- other courses in the department selected in consultation with advisor.

Cognate (12 hours)

Twelve (12) hours in the College of Education (determined by the departments of Mathematical Sciences, Educational Leadership, and Elementary and Special Education).

Program Notes

Candidate must

1. file a degree plan in the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which candidate intends to graduate.

Mathematics, Research Preparation Concentration, M.S.

James Hart, Program Director

(615) 898-2402

James.Hart@mtsu.edu

The Department of Mathematical Sciences offers the Master of Science with a major in Mathematics, the Master of Science in Teaching with a major in Mathematics, and a minor in Mathematics at the graduate level.

Three concentrations are offered under the Master of Science: General Mathematics (students desiring a broad background in mathematics should pursue this concentration); Industrial Mathematics (students interested in positions in industry or further graduate work in applied mathematics should pursue this concentration); and Research Preparation (students wishing to pursue the Ph.D. in Mathematics should choose this concentration).

Two concentrations are offered under the Master of Science in Teaching: Middle Grade Mathematics and Secondary Mathematics.

The department also offers courses in the Master of Science in Professional Science degree. Students interested in a concentration in Biostatistics or in Actuarial Sciences should refer to the Master's of Science in Professional Science program.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admission normally requires completion of the GRE or MAT with acceptable scores. (Successful applicants typically have combined GRE scores of 291 [current scale] or 900 [former scale] or above or MAT scores of 402 or greater.)

Applicant must

1. have earned a bachelor's degree from an accredited university or college;
2. have an acceptable grade point average for all college work taken;
3. have completed 21 semester hours of college-level mathematics (including calculus), with at least 9 hours of mathematics beyond calculus.

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

Master of Science in Mathematics applicants must

1. submit application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit official scores on the GRE or MAT;
3. submit official transcripts of all previous college work;
4. two letters of recommendation are recommended, but not required.

Degree Requirements

The Master of Science in Mathematics with a concentration in Research Preparation requires completion of 36 hours consisting of a 9-hour core, 18 hours in the concentration, and a 9-hour cognate approved by the advisor.

Candidate must

1. participate in the graduate seminar and give an oral presentation of an approved topic;
2. successfully complete a written comprehensive examination (may be taken no more than twice);
3. take two additional one-hour comprehensive exams over courses of their choosing if not completing a thesis.

Curriculum: Mathematics, Research Preparation

Required Core Courses (9 hours)

- MATH 6120 - Advanced Linear Algebra **3 credit hours**
- MATH 6170 - Sets and Logic **3 credit hours**
- MATH 6190 - Analysis I **3 credit hours**

Concentration (18 hours)

- MATH 5270 - Introduction to Topology **3 credit hours**
- MATH 5530 - Abstract Algebra II **3 credit hours**
- MATH 5700 - Combinatorics and Graph Theory **3 credit hours**
- MATH 6200 - Analysis II **3 credit hours**
- MATH 6140 - Selected Topics of Modern Mathematics: Algebra **3 credit hours**
- MATH 6210 - Complex Variables **3 credit hours**

Cognate (9 hours)

Nine (9) hours including MATH 6640 and six (6) additional hours approved by advisor.

Program Notes

Candidate must

1. file a degree plan in the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which candidate intends to graduate.

Mathematics, Secondary Mathematics Concentration, M.S.T.

Michaele Chappell, M.S.T. Program Director

(615) 898-2393

Michaele.Chappell@mtsu.edu

The Department of Mathematical Sciences offers the Master of Science with a major in Mathematics, the Master of Science in Teaching with a major in Mathematics, and a minor in Mathematics at the graduate level.

Three concentrations are offered under the Master of Science: General Mathematics, Industrial Mathematics, and Research Preparation. For those interested in teaching, two concentrations are offered under the Master of Science in Teaching: Middle Grade Mathematics and Secondary Mathematics.

The department also offers courses in the Master of Science in Professional Science degree. Students interested in a concentration in Biostatistics or in Actuarial Sciences should refer to the Master's of Science in Professional Science program.

Please see undergraduate catalog for information regarding undergraduate programs.

Admission Requirements

Admission to the Master of Science in Teaching in Mathematics with a concentration in Secondary Mathematics program requires

1. an earned bachelor's degree from an accredited university or college;
2. an acceptable grade point average for all college work taken;
3. a valid secondary teaching certificate or completion of 9 hours of mathematics past the calculus sequence (I, II, III) or be seeking initial licensure to teach secondary mathematics*;
4. completion of the GRE or MAT with acceptable scores (MAT score generally expected to meet or exceed 402).

NOTE: Any candidate not meeting these requirements may petition to the Mathematics Education Graduate Admissions Committee.

Application Procedures

All application materials are to be submitted to the College of Graduate Studies.

Applicant must

1. submit application with the appropriate application fee (online at www.mtsu.edu/graduate/apply.php);
2. submit official scores on the GRE or MAT;
3. submit official transcripts of all previous college work;
4. submit two letters of recommendation.

Degree Requirements

Candidate must

1. complete 36 hours of graduate courses (see Curriculum section below for specifics);
2. successfully complete a comprehensive examination (may be taken no more than twice).

Curriculum: Mathematics, Secondary Mathematic

Candidate must complete 36 hours in the following course of study:

Required Core Courses (9 hours)

- MATH 6320 - Mathematical Problem Solving **3 credit hours**
- MATH 6380 - Current Trends in Mathematics Education **3 credit hours**
- MATH 6900 - Research in Mathematics Education **3 credit hours**

Concentration Courses (15 hours)

- MATH 6170 - Sets and Logic **3 credit hours**
- Three additional courses from the department to be selected in consultation with the advisor.
plus one course from:
- STAT 6020 - Introduction to Biostatistics **3 credit hours**
- STAT 6602 - Problems in Statistics-Regression Analysis **3 credit hours**
- STAT 6603 - Problems in Statistics-Nonparametric Statistics **3 credit hours**
- STAT 6604 - Problems in Statistics-Experimental Design **3 credit hours**

Cognate (12 hours)

Twelve (12) hours in the College of Education (determined jointly by the departments of Mathematical Sciences and Educational Leadership).

Program Notes

Candidate must

1. file a degree plan in the College of Graduate Studies prior to entry into the program;
2. file a Notice of Intent to Graduate form in the College of Graduate Studies within the first two weeks of the term in which candidate intends to graduate.

Actuarial Sciences

ACSI 5140 - Mathematical Foundations of Actuarial Science

3 credit hours

Prerequisites: ACSI/MATH 3020 (or MATH 3110) and STAT 3150 or consent of instructor. A preparatory course for the Society of Actuaries/Casualty Actuarial Society Course/Exam 1. Integrates calculus, probability, and risk management topics into fundamental tools for assessing risk in an actuarial environment. Calculus and probability topics include derivatives, integrals, partials, random variables, distributions, and conditional probability. Risk topics include frequency and severity. Insurance concepts such as retention, deductible, coinsurance, and risk premium.

ACSI 5200 - Introduction to Mathematics of Investment

3 credit hours

(Same as MATH 5200.) Prerequisite: MATH 1920 or consent of instructor. Calculus and probability/statistics used to model and analyze investments in bonds, treasury bills, stocks, and other derivatives. Topics include obtaining the price of a bond as a function of interest rate, developing formulas for duration and convexity to study the sensitivity of price to interest rate, and mathematical modeling of investor preference and attitude toward risk.

ACSI 5220 - Mathematics of Corporation Finance

3 credit hours

Prerequisites: ACSI/MATH 4200/ACSI 5200/MATH 5200 and ECON 2410, 2420, or consent of instructor. A preparatory course for the Society of Actuaries/Casualty Actuarial Society Course/Exam 2. Applies calculus and theory of interest tools to intermediate topics in microeconomics. Topics include the mathematics of supply, demand, and equilibrium; prices, costs, and the gains from trade; consumer behavior; elasticities; competition; monopoly; market power, collusion, and oligopoly; the mathematics of risk and uncertainty; and surplus economics.

ACSI 5230 - Mathematics of Compound Interest

3 credit hours

Prerequisite: ACSI/MATH 4200/ACSI 5200/MATH 5200 or consent of instructor. A preparatory course for the Society of Actuaries/Casualty Actuarial Society Course/Exam 2. Topics include measurement of

interest (including accumulating and present value factors), annuities certain, yield rates, amortization schedules, sinking funds, and bonds and related securities.

ACSI 5240 - Mathematics of Interest Theory, Economics, and Finance

3 credit hours

Prerequisites: ACSI 4230/ACSI 5230 or consent of instructor. A preparatory course for the Society of Actuaries/Casualty Actuarial Society Course/Exam 2. Applies calculus and theory of interest tools to intermediate topics in microeconomics and macroeconomics and topics in finance. Topics include pricing activities, the simplified Keynesian model, interest and discount rates, valuation of payment streams, yield rates, amortization, cash flows and internal rate of return, stock and bond valuation, portfolio risks, the Capital Asset Pricing Model (CAPM), efficient markets, capital structure, leverage, financial performance measurement, and basic option pricing and the Black-Scholes model.

ACSI 5330 - Actuarial Mathematics I

3 credit hours

Prerequisites: ACSI 4230/ACSI 5230 and STAT 4190 or consent of instructor. First of a two-semester sequence; a preparatory course for the Society of Actuaries/Casualty Actuarial Society Course/Exam 3. Topics include survival distributions and life tables, life insurance, life annuities, and net premiums.

ACSI 5340 - Actuarial Mathematics II

3 credit hours

Prerequisite: ACSI 4230/ACSI 5230 and STAT 4190 or consent of instructor. Second of a two-semester sequence; a preparatory course for the Society of Actuaries/Casualty Actuarial Society Course/Exam 3. Topics chosen from net premium reserves, multiple life functions, multiple decrement models, valuation theory and pension plans, and insurance models (including expenses and nonforfeiture benefits and dividends).

ACSI 5600 - Problems in Actuarial Science

1 to 6 credit hours

Prerequisite: Consent of instructor. Students wishing to enroll must submit a written course/topic proposal to the department prior to the semester in which ACSI 5600 is taken. The proposal must be approved prior to student taking the course. At the conclusion of this course, each enrollee must submit a written report to the department.

ACSI 5630 - Mathematics of Risk Management
3 credit hours

Prerequisite: ACSI/MATH 4200/ACSI 5200/MATH 5200. A preparatory course for the Society of Actuaries Course 6. Topics include mathematical modeling of volatility; pricing of bonds, stocks, and other derivatives with uncertainty; benchmark portfolios; asset/liability management for property/casualty insurers; liability associated with a financially distressed company. Heath-Jarrow-Morton and Cox-Ingersoll-Ross models studied.

ACSI 5640 - Mathematics of Options, Futures, and Other Derivatives
3 credit hours

Prerequisites: ACSI/MATH 4630/ACSI 5630/5630 and 4200/ACSI 5200/MATH 5200. A preparatory course for the Society of Actuaries Course 6. Topics include risk management using options, interest rate swaps, interest rate caps, Black-Scholes analysis, Taylor series expansion to obtain hedge parameters, portfolio insurance, numerical procedures, interest rate derivatives, and use of Black's model.

ACSI 6010 - Credibility Theory and Loss Distributions
3 credit hours

Prerequisite: STAT 5190 or consent of instructor. A preparatory course for Exam Part 4B of the Casualty Actuarial Society. Topics include Bayes Theorem and its relationship to credibility theory and analysis of statistical distributions for modeling insurance claims by size.

ACSI 6020 - Construction and Evaluation of Actuarial Models
3 credit hours

Prerequisite: STAT 5140 or permission of instructor. Introduces modeling and covers important actuarial methods useful in modeling. Assumes a thorough knowledge of calculus, probability, and mathematical statistics. Serves as a preparatory course for the Society of Actuaries/Casualty Actuarial Society Course-C/Exam 4. Topics include construction of empirical models, construction and selection of parameter models, credibility, interpolation and smoothing, and simulation.

ACSI 6030 - Actuarial Models for Life Contingencies
3 credit hours

Prerequisites: STAT 3150 and ACSI 4230 or permission of instructor. A preparatory course for

Exam-MLC (Exam-3L) for the Society of Actuaries (Casualty Actuarial Society). Topics include survival distributions, life tables, life insurance, life annuities, and pensions, premiums and reserves, multiple lives, multiple decrements, models including expenses.

ACSI 6040 - Actuarial Models for Financial Economics
3 credit hours

Prerequisite: ACSI 4200 or equivalent. A preparatory course for Exam-MFE (Exam-3F) for the Society of Actuaries (Casualty Actuarial Society). Topics include applications of stochastic processes to actuarial models, Poisson process, Markov process, interest rate models, arbitrage free models, valuation of derivative securities, financial risk management.

ACSI 6110 - Predictive Analysis
3 credit hours

Prerequisite: ACSI 5140 or consent of instructor. Topics include generalized linear models, logistic regression, discriminant analysis, support vector machines, ridge regression, lasso, sparse modeling, variable selection, model selection, and other selected topics from computational statistics, machine learning, and data mining.

ACSI 6600 - Problems in Actuarial Science
1 to 6 credit hours

Prerequisites: Mathematical maturity, preparation in actuarial science (normally nine semester hours of graduate study in actuarial science), and consent of instructor. Students wishing to enroll must select a topic in actuarial science prior to the semester in which ACSI 6600 is taken. Topics include, but are not limited to, applications of principles of actuarial mathematics to group and health insurance, retirement benefits, quantitative risk management, rate making, statistical methods in actuarial data analysis, interest rate models and their applications. Students must submit a written report. Course may be taken up to two times provided that the projects are completely different. Credits may total 1-12 hours. Credit will be based on the difficulty and complexity of the project as determined by the instructor. Pass/Fail grading.

Mathematics

MATH 5010 - Concepts of Mathematics
3 credit hours

Recommended for students preparing to become elementary school teachers. Topics include complex

numbers, finite mathematical systems, linear equations and inequalities, functions and their graphs, introductory matrix algebra, interest and consumer credit, and microcomputer applications in the mathematics classroom

MATH 5200 - Introduction to Mathematics of Investment

3 credit hours

(Same as ACSI 5200.) Prerequisite: MATH 1920 or consent of instructor. Calculus and probability/statistics used to model and analyze investments in bonds, treasury bills, stocks, and other derivatives. Topics include obtaining the price of a bond as a function of interest rate, developing formulas for duration and convexity to study the sensitivity of price to interest rate, and mathematical modeling of investor preference and attitude toward risk.

MATH 5270 - Introduction to Topology

3 credit hours

Prerequisites: MATH 3110 and a previous upper-division course in which the student has been required to write proofs. Fundamental concepts of topology including continuity, compactness, connectedness, separation axioms, and metric spaces.

MATH 5310 - Numerical Analysis I

3 credit hours

Prerequisite: CSCI 3180 or equivalent. Application of computer-oriented numerical algorithms to algebraic equations, differential and integral equations, and linear algebra. Rigorous mathematical treatment of error included.

MATH 5320 - Numerical Analysis II

3 credit hours

Prerequisite: CSCI 3180 or equivalent. Application of computer-oriented numerical algorithms to algebraic equations, differential and integral equations, and linear algebra. Rigorous mathematical treatment of error included.

MATH 5420 - Number Theory

3 credit hours

Divisibility congruences, quadratic residues, Diophantine equations, quadratic forms, and continued fractions.

MATH 5470 - Introduction to Modern Algebra

3 credit hours

A treatment of sets, relations, operations, and the construction of number systems in algebra.

MATH 5510 - Abstract Algebra I

3 credit hours

Groups with a brief introduction to rings, integral domains, and fields.

MATH 5530 - Abstract Algebra II

3 credit hours

Prerequisite: MATH 4510 or MATH 5510. Theory of rings, fields, integral domains, matrices, and vector spaces.

MATH 5600 - Problems in Contemporary Mathematics

1 to 6 credit hours

Pass/Fail grading in specified sections.

MATH 5620 - History and Philosophy of Mathematics

3 credit hours

Prerequisites: Background in geometry, number theory, and/or symbolic logic helpful. The character of mathematical thought by way of mathematical problems which have occupied successively the outstanding mathematicians of Babylon, Egypt, Greece, China, the Renaissance, and modern times paralleled with a study of three schools of mathematical philosophy: intuitionism, logicism, and formalism. Open only to senior and graduate mathematics majors.

MATH 5700 - Combinatorics and Graph Theory

3 credit hours

Prerequisite: MATH 2010 or 3080. Selected topics in combinatorics and graph theory emphasizing combinatorial problem solving and algorithmic proof.

MATH 6100 - Mathematics for Teachers

3 credit hours

Mathematics as problem solving, communication, and reasoning. Connecting different fields of mathematics. Topics include number and number relationships, number systems and number theory, computation and estimation, patterns and functions, statistics and probability, algebra, geometry, measurement.

MATH 6120 - Advanced Linear Algebra**3 credit hours**

Prerequisite: MATH 2010. Continuation of linear algebra topics in MATH 2010 including advanced topics in inner product spaces and structure of linear operators.

MATH 6140 - Selected Topics of Modern**Mathematics: Algebra****3 credit hours**

Prerequisite: MATH 5530 or consent of instructor. Extension of previous work in algebra with emphasis on topics not treated in other courses.

MATH 6141 - Selected Topics of Modern**Mathematics: Analysis****3 credit hours**

Prerequisite: MATH 6200 or consent of instructor. Extension of previous work in analysis with emphasis on topics not treated in other courses.

MATH 6142 - Selected Topics in Modern**Mathematics: Topology****3 credit hours**

Prerequisite: MATH 4270 or MATH 5270 or consent of instructor. Extension of previous work in topology with emphasis on topics not treated in other courses.

MATH 6170 - Sets and Logic**3 credit hours**

Includes topics in three categories: 1) Propositions, predicates, quantifiers, truth tables, tautologies, and methods of mathematical proof including mathematical induction. 2) Sets, relations, functions, graphs, cardinality, and the Axiom of Choice. 3) Applications of these foundations to selected results in algebra and analysis as time permits. It is recommended that this course be taken early in the graduate program.

MATH 6190 - Analysis I**3 credit hours**

Prerequisite: MATH 4250 or equivalent. Rigorous treatment of limits, continuity, differentiation, and integration; infinite series; introduction to metric spaces.

MATH 6200 - Analysis II**3 credit hours**

Prerequisite: MATH 6190 or equivalent. A continuation of MATH 6190. Lebesgue measure, Lebesgue integral, functions of bounded variation.

MATH 6210 - Complex Variables**3 credit hours**

Prerequisite: MATH 6190. Theory of functions of complex variables and their application in mathematics and physics.

MATH 6230 - Teaching of Introductory College Mathematics**3 credit hours**

Foundations and pertinent topics in college algebra, trigonometry, analytic geometry, and calculus with emphasis on techniques of presentation.

MATH 6250 - Real Analysis**3 credit hours**

Prerequisite: MATH 6200. A continuation of MATH 6200. Advanced topics in real analysis. Abstract measure and integration theory. Introduction to functional analysis.

MATH 6260 - Advanced Differential Equations I**3 credit hours**

Prerequisites: MATH 3120 and 4250. Qualitative and quantitative analysis of systems of differential equations. Gradient systems, Sturm-Liouville problems. Elementary techniques for boundary value problems of partial differential equations.

MATH 6270 - Advanced Differential Equations II**3 credit hours**

Prerequisite: MATH 6260. Solution techniques for boundary value problems. Problems involve heat, wave, and potential equations. Topics include the method of characteristics, series solutions, integral transforms, and Green's functions.

MATH 6300 - Optimization**3 credit hours**

Prerequisite: MATH 5320 or consent of instructor. Constrained and unconstrained optimization problems, including the generalized least squares problem and Eigenvalue problems. Methods include orthogonalization, conjugate gradient, and quasi-Newton algorithms.

MATH 6310 - Control Theory**3 credit hours**

Prerequisite: MATH 6260 or consent of instructor. Vector space applications to system analysis; observability, controllability, and stabilization of systems; feedback systems; Lyapunov methods; optimal control, and the calculus variations.

MATH 6320 - Mathematical Problem Solving**3 credit hours**

Prerequisite: Permission of instructor. A basis for reflection on teaching and learning mathematics. Problem-solving strategies and heuristics. Focuses on all branches of mathematics, providing an opportunity to synthesize mathematical knowledge.

MATH 6330 - Algebra from an Advanced**Perspective****3 credit hours**

Prerequisite: Permission of instructor. Review and extension of algebraic skills and concepts as they relate to the teaching and learning of algebra. Focus on algebraic thinking and problem solving, algebraic systems, functions, graphing, and linear algebra.

MATH 6340 - Geometry from an Advanced**Perspective****3 credit hours**

Prerequisite: Permission of instructor. Investigations into the foundations of plane, solid, and coordinate geometry, motion geometry, similarities and congruencies, measurement and the application of geometry. Instruction will model the suggested pedagogy appropriate for school mathematics.

MATH 6350 - Probability and Statistics from an**Advanced Perspective****3 credit hours**

Prerequisite: Permission of instructor. Relation to school mathematics. Development of central tendency and variation, concepts of chance including sample space, randomness, conditional probability, and independence.

MATH 6360 - Technology Tools for School**Mathematics****3 credit hours**

Integrates technology into the teaching and learning process for teachers of middle and secondary school mathematics. Investigates a variety of mathematical subject matter appropriate for middle and secondary school students via technology. Lessons designed for use with a variety of technologies, including graphing calculators, dynamic geometry software, spreadsheets, authoring software, presentation software, and the World Wide Web. Highly individualized due to varying backgrounds and interests of students.

MATH 6380 - Current Trends in Mathematics**Education****3 credit hours**

Prerequisite: Permission of instructor. Innovative topics or critical issues related to the teaching and learning of mathematics. Includes history of mathematics education, pedagogical content knowledge, assessment and evaluation, and technologies.

MATH 6400 - Advanced Geometry**3 credit hours**

Prerequisite: MATH 3070 or consent of instructor. Detailed study of one or more of the various branches of geometry including non-Euclidean geometry, projective geometry, algebraic geometry, and differential geometry.

MATH 6510 - Advanced Algebra**3 credit hours**

Prerequisite: MATH 5530. Polynomial rings, theory of fields, vector spaces and intermediate group theory necessary for Galois theory, and Galois theory.

MATH 6601 - Problems in Mathematics-Advanced Calculus**1 to 9 credit hours**

Prerequisite: Mathematical maturity, preparation in the area, and normally nine semester hours of graduate study. Problems course dealing with theory methods and applications.

MATH 6602 - Problems in Mathematics-Number Theory**1 to 9 credit hours**

Prerequisite: Mathematical maturity, preparation in the area, and normally nine semester hours of graduate study. Problems course dealing with theory methods and applications.

MATH 6603 - Problems in Mathematics-Mathematics of Finance**1 to 9 credit hours**

Prerequisite: Mathematical maturity, preparation in the area, and normally nine semester hours of graduate study. Problems course dealing with theory methods and applications.

MATH 6604 - Problems in Mathematics-Mathematics of Life Contingencies**1 to 9 credit hours**

Prerequisite: Mathematical maturity, preparation in the area, and normally nine semester hours of

graduate study. Problems course dealing with theory methods and applications.

MATH 6605 - Problems in Mathematics-Numerical Analysis

1 to 9 credit hours

Prerequisite: Mathematical maturity, preparation in the area, and normally nine semester hours of graduate study. Problems course dealing with theory methods and applications.

MATH 6606 - Problems in Mathematics-Topology

1 to 9 credit hours

Prerequisite: Mathematical maturity, preparation in the area, and normally nine semester hours of graduate study. Problems course dealing with theory methods and applications.

MATH 6607 - Problems in Mathematics-Abstract Algebra

1 to 9 credit hours

Prerequisite: Mathematical maturity, preparation in the area, and normally nine semester hours of graduate study. Problems course dealing with theory methods and applications.

MATH 6608 - Problems in Mathematics-Combinatorics and Graph Theory

1 to 9 credit hours

Prerequisite: Mathematical maturity, preparation in the area, and normally nine semester hours of graduate study. Problems course dealing with theory methods and applications.

MATH 6611 - Problems in Mathematics

1 to 6 credit hours

Prerequisite: Consent of instructor. Problem-oriented course providing opportunities for mathematical study in areas of need. Pass/Fail grading.

MATH 6612 - Problems in Mathematics

1 to 6 credit hours

Prerequisite: Consent of instructor. Problem-oriented course providing opportunities for mathematical study in areas of need. Standard letter grading.

MATH 6640 - Thesis Research

1 to 6 credit hours

Selection of a research problem, review of pertinent literature, collection and analysis of data, and composition of thesis. Once enrolled, student should register for at least one credit hour of master's

research each semester until completion. S/U grading.

MATH 6700 - Advanced Combinatorics and Graph Theory

3 credit hours

Prerequisite: MATH 4700/MATH 5700. Selected topics in combinatorics and graph theory extending topics studied in MATH 4700/MATH 5700.

MATH 6900 - Research in Mathematics Education

3 credit hours

Prerequisite: Permission of instructor. Examines factors influencing research and critical analyses of selected research in mathematics education. Studies representing different methodologies critiqued.

MATH 6999 - Comprehensive Examination and Preparation

1 credit hours

Open only to students who are not enrolled in any other graduate course and who will take the master's comprehensive examination during the term. The student must contact the graduate advisor during the first two weeks of the term for specifics regarding the details of this comprehensive examination preparatory course. Credit may not be applied to degree requirements.

MATH 7060 - Independent Study

1 to 9 credit hours

MATH 7310 - Theoretical Frameworks in Mathematics Education

3 credit hours

Focuses on how researchers utilize theoretical frameworks while conducting and reporting research in mathematics education. Attention given to prominent theoretical frameworks in mathematics education and the role of frameworks in connecting methodology and the reporting of findings in mathematics education research.

MATH 7320 - Mathematical Problem Solving

3 credit hours

Required of students in Mathematics Education concentration of Mathematics and Science Education Ph.D. program. Examines research on teaching and learning mathematics through problem solving as a process, problem-solving strategies and heuristics, and assessing problem solving. Focuses on all branches of mathematics providing an opportunity to synthesize mathematical knowledge.

MATH 7330 - Ethics in Mathematics Education
3 credit hours

Prerequisite: Admission to MSE program and successful completion of either MATH 6900 or MSE 7848. Focuses on the philosophical and theoretical perspectives of ethics and ethical decision making as they relate to the roles and responsibilities of teacher education and researchers in mathematics education. Ethical decision making will be applied through the teaching case method.

MATH 7340 - History, Curriculum, and Policy in Mathematics Education
3 credit hours

Prerequisite: Admission to MSE program. Explores the history of mathematics education with particular attention to curriculum development and policy development. Major factors that influence the development of curriculum and policy discussed.

MATH 7450 - Mathematical Modeling I
3 credit hours

Prerequisites: COMS 6100 and COMS 6500. Intense lecture and project-oriented course that covers current topics in mathematical modeling in physical and biological sciences.

MATH 7611 - Problems in Mathematics
1 to 6 credit hours

Prerequisite: Consent of instructor. Problem-oriented course providing opportunities for mathematical study in areas of need. Pass/Fail grading.

MATH 7612 - Problems in Mathematics
1 to 6 credit hours

Prerequisite: Consent of instructor. Problem-oriented course providing opportunities for mathematical study in areas of need. Standard letter grading.

MATH 7640 - Dissertation Research
1 to 6 credit hours

Selection of a research problem, review of pertinent literature, collection and analysis of data, and composition of dissertation. Once enrolled student should register for at least one credit hour of doctoral research each semester until completion. S/U grading.

MATH 7750 - Mathematical Modeling II
3 credit hours

Prerequisite: MATH 7450. Covers mathematical models involving partial differential equations, partial

differential integral equations, multiscale modeling, and simulation in physical and biological sciences.

MATH 7800 - Teaching Internship
3 credit hours

Prerequisite: Permission of department. Admission based on recommendations and performance in teaching. Offered every term.

MATH 7810 - Teaching Internship
3 credit hours

Prerequisite: Permission of department. Admission based on recommendations and performance in teaching. Offered every term.

MATH 7900 - Teaching and Learning Mathematics
3 credit hours

Focus on theoretical and practical issues regarding how students learn mathematics, best practices for teaching mathematics, and issues from current literature on the teaching and learning of mathematics.

Statistics

STAT 5140 - Probabilistic and Statistical Reasoning
3 credit hours

Prerequisite: Must be enrolled in the Master of Science in Professional Sciences program; graduate level. Focuses on probability and statistics concepts. Topics include binomial and normal probabilistic modeling; important statistical concepts such as confounding, randomization, sampling variability and significance; statistical testing of significant differences and associations; and design experiments to test research hypotheses.

STAT 5190 - Mathematical Statistics II
3 credit hours

Prerequisite: STAT 3150 or equivalent. Theory of statistical inference. Topics include sampling distributions, decision theory, estimation, test of hypothesis, regression analysis, analysis of variance, and selected applications.

STAT 5200 - Statistical Methods for Forecasting
3 credit hours

Prerequisite: STAT 4190. Application of the regression model in forecasting regression and exponential smoothing methods to forecast nonseasonal time-series, seasonal series and globally constant seasonal models, stochastic time series

models; and forecast evaluation. (Offers preparation to actuarial science students for the Society of Actuaries Exam #120 and Exam Part 3A administered by the Casualty Actuarial Society.)

STAT 5320 - Probability and Stochastic Processes
3 credit hours

Prerequisite: Two semesters of calculus and STAT 3150 (or MATH 2050) or consent of instructor. Theoretical basis for stochastic processes and use as models of real-world phenomena. Topics include Markov chains, Poisson processes, and Brownian motion and stationary processes. Applications include Gambler's Ruin, birth and death models, hitting times, stock option pricing, and the Black-Scholes model.

STAT 5360 - Regression Analysis
3 credit hours

Prerequisites: MATH 2050 and STAT 3150 or equivalent. Theory and application of regression models. Approaches to model building and data analysis treated. Computation and interpretation of results facilitated through use of statistical software packages.

STAT 5370 - Nonparametric Statistics
3 credit hours

Prerequisite: STAT 3150 or equivalent. Statistical tests that require no assertions about parameters or about the form of the population from which the samples are drawn. A wide range of practical problems.

STAT 5380 - Experimental Design
3 credit hours

Prerequisite: STAT 3150 or equivalent. Topics include one-way analysis of variance, multiple comparison, multifactor analysis of variance, and various practical issues in experimental design. Computation and interpretation of results are facilitated through the use of statistical software packages.

STAT 5600 - Problems in Statistics
1 to 6 credit hours

Prerequisite: Senior standing and consent of instructor. Students wishing to enroll must submit a written course/topic proposal to the department prior to the semester in which STAT 5600 is taken. Proposal must be approved prior to student taking the course. At the conclusion of the course, each enrollee must submit a written report to the department.

STAT 6020 - Introduction to Biostatistics
3 credit hours

Prerequisite: Introductory probability/statistics course or permission of instructor. Contemporary and medical research methodology for biostatistics. Descriptive and inferential statistics including parametric and nonparametric hypothesis testing methods, sample size, statistical significance and power, survival curve analysis, relative risk, odds ratios, chi square modeling, and analysis of variance. Data will be analyzed using statistical software.

STAT 6160 - Advanced Mathematical Statistics I
3 credit hours

Prerequisite: Two semesters of calculus or permission of instructor. Introduction to theoretical probability used in statistics with an emphasis on the mathematical theory. A rigorous treatment of random variables, their probability distributions, and mathematical exceptions in a univariate and multivariate setting. Includes conditional probabilities, stochastic independence, sampling theory, and limit laws.

STAT 6180 - Advanced Mathematical Statistics II
3 credit hours

Prerequisite: STAT 6160 or permission of instructor. Theory of estimation and hypothesis tests. Topics include minimum variance unbiased estimation, methods of estimation, most powerful tests, likelihood ratio tests, decision theory, and sequential test procedures.

STAT 6510 - Biostatistical Methods
3 credit hours

Prerequisite: STAT 6020 or permission of instructor. Biostatistical methods focusing on the design and analysis of clinical trials and sample surveys. Topics include clinical trial designs and phases, bias, random error, sample size, power, estimating clinical effects, design-based methods of data analysis from sample surveys, sampling techniques, nonresponse, and sampling frame issues.

STAT 6520 - Advanced Biostatistical Methods
3 credit hours

Prerequisites: STAT 6020 and STAT 6160 or permission of instructor. Mathematically rigorous presentation of categorical data analysis methods for univariate and correlated multivariate responses including contingency table analysis, logistic regression, and loglinear models; survival analysis for analyzing time-to-event data including survivor

functions, Kaplan-Meier curves, and Cox proportional hazards model; and other health applications of multivariate analysis methods.

STAT 6600 - Problems in Statistics

3 credit hours

Prerequisite: Mathematical maturity, preparation in the area and (normally) nine semester hours of graduate study. Problems course dealing with theory, methods, and applications.

STAT 6601 - Problems in Statistics-Mathematical Statistics

3 credit hours

Prerequisite: Mathematical maturity, preparation in the area and (normally) nine semester hours of graduate study. Problems course dealing with theory, methods, and applications.

STAT 6602 - Problems in Statistics-Regression Analysis

3 credit hours

Prerequisite: Mathematical maturity, preparation in the area and (normally) nine semester hours of graduate study. Problems course dealing with theory, methods, and applications.

STAT 6603 - Problems in Statistics-Nonparametric Statistics

3 credit hours

Prerequisite: Mathematical maturity, preparation in the area and (normally) nine semester hours of graduate study. Problems course dealing with theory, methods, and applications.

STAT 6604 - Problems in Statistics-Experimental Design

3 credit hours

Prerequisite: Mathematical maturity, preparation in the area and (normally) nine semester hours of graduate study. Problems course dealing with theory, methods, and applications.

STAT 6605 - Problems in Statistics-SAS Programming

1 to 9 credit hours

Prerequisite: Mathematical maturity, preparation in the area and (normally) nine semester hours of graduate study. Problems course dealing with theory, methods, and applications.

STAT 7020 - Introduction to Biostatistics

3 credit hours

Introductory probability/statistics course or permission of instructor. Contemporary and medical research methodology for biostatistics. Descriptive and inferential statistics including parametric and nonparametric hypothesis testing methods, sample size, statistical significance and power, survival curve analysis, relative risk, odds ratios, chi square modeling, and analysis of variance. Data will be analyzed using statistical software. Applied biostatistics research project required (7000) level.

STAT 7400 - Computational Statistics

3 credit hours

Prerequisites: COMS 6100 and STAT 5140 or equivalent. Statistical visualization and other computationally intensive methods. The role of computation as a fundamental tool of discovery in data analysis, statistical inference, and development of statistical theory and methods. Monte Carlo studies in statistics, computational inference, tools for identification of structure in data, numerical methods in statistics, estimation of functions (orthogonal polynomials, splines, etc.), statistical models, graphical methods, data fitting and data mining, and machine learning techniques.

STAT 7600 - Problems in Statistics

1 to 9 credit hours

Prerequisite: Permission of instructor, mathematical maturity, preparation in the area, and (normally) nine semester hours of graduate study. Problems course dealing with theory, methods, and applications.

STAT 7601 - Problems in Statistics-Mathematical Statistics

1 to 9 credit hours

Prerequisite: Permission of instructor, mathematical maturity, preparation in the area, and (normally) nine semester hours of graduate study. Problems course dealing with theory, methods, and applications.

STAT 7602 - Problems in Statistics: Regression Analysis

1 to 9 credit hours

Prerequisite: Permission of instructor, mathematical maturity, preparation in the area, and (normally) nine semester hours of graduate study. Problems course dealing with theory, methods, and applications.

**STAT 7603 - Problems in Statistics:
Nonparametric Statistics
1 to 9 credit hours**

Prerequisite: Permission of instructor, mathematical maturity, preparation in the area, and (normally) nine semester hours of graduate study. Problems course dealing with theory, methods, and applications.

**STAT 7604 - Problems in Statistics: Experimental
Design
1 to 9 credit hours**

Prerequisite: Permission of instructor, mathematical maturity, preparation in the area, and (normally) nine semester hours of graduate study. Problems course dealing with theory, methods, and applications.

**STAT 7605 - Problems in Statistics: SAS
Programming
1 to 9 credit hours**

Prerequisite: Permission of instructor, mathematical maturity, preparation in the area, and (normally) nine semester hours of graduate study. Problems course dealing with theory, methods, and applications.

**STAT 7800 - Teaching Internship
3 credit hours**

Prerequisite: Permission of department. Admission based on recommendations and performance in teaching. Offered every term.

**STAT 7810 - Teaching Internship
3 credit hours**

Prerequisite: Permission of department. Admission based on recommendations and performance in teaching. Offered every term.

Physics and Astronomy

Ron Henderson, Chair

(615) 898-2130

www.mtsu.edu/physics/

The Department of Physics and Astronomy offers a minor at the graduate level. The department also offers courses in the Ph.D. in Molecular Biosciences and the Ph.D. in Computational Science.

Physics Minor

There are two patterns of minors from which a candidate may choose:

1. A single minor consisting of at least 12 semester hours; a minimum of 12 undergraduate hours in an area are prerequisite to a single minor in that area at the master's level.
2. A minor consisting of a minimum of 6 semester hours in each of two subjects. The candidate is expected to complete the total program in the major, minor, and/or cognate fields. A cognate is defined as 6 semester hours.

Physics

PHYS 5310 - Electricity and Magnetism **3 credit hours**

Topics including electric and magnetic fields, electrostatic potential, and potential energy and fields in matter discussed in a mathematically rigorous manner. A variety of good applications of mathematical methods in physics.

PHYS 5380 - Introduction to Quantum Mechanics **3 credit hours**

Origin of quantum theory; wave packets and deBroglie waves; Heisenberg uncertainty principles. Schroedinger wave equation, operators, eigenfunctions, square well potential, the harmonic oscillator, the hydrogen atom, molecular binding and molecular spectra.

PHYS 6330 - Principles of Modern Physics **3 credit hours**

Charged particles and their behaviors; electronic structures of the atoms; nuclear structures and processes; and radiation.

PHYS 6340 - Fundamentals of Physics **6 credit hours**

Basic laws and principles of classical and modern physics. Lecture topics and laboratory experiences designed to advance student's knowledge of physics.

PHYS 7010 - Principles of Molecular Biophysics **3 credit hours**

Prerequisite: PHYS 2021 or 2120 or permission of department. Reviews the structure of proteins, nucleic acids, carbohydrates, lipids, and the forces and interactions maintaining their structures in solution; thermodynamics and kinetics of protein folding; polymer chain statistics and helix-coil transitions in biopolymers; biopolymer dynamics; structural methods in biology; X-ray crystallography, NMR and fluorescence spectroscopy, electron and probe microscopy, single-molecule methods.

PHYS 7400 - Computational Physics I **3 credit hours**

Prerequisites: COMS 6500 and COMS 6100 and CSCI 6020 or consent of instructor. Expresses physical phenomena in mathematical form and then adapting these models for analysis using the techniques of computational physics. Covers a number of the computational standards of modern physics such as chaotic dynamics, spectral analysis, Monte Carlo methods, and optimization techniques such as genetic algorithms and simulated annealing.