

College of Science and Technology

Graduate Degrees 2001-2002

Department	Major	Degree
Master's Level		
School of Engineering Technology	Engineering Technology	Master of Science
	Workforce Training and Development	Master of Science
Biological Sciences	Biological Sciences	Master of Science
	Biological Sciences Emphasis	
	Environmental Biology Emphasis	
	Marine Biology Emphasis	
	Microbiology Emphasis	
Chemistry and Biochemistry	Molecular Biology Emphasis	
	Chemistry	Master of Science
Computer Science and Statistics	Biochemistry Emphasis	
	Chemistry Emphasis	
	Computer Science	Master of Science
Geology	Computational Science Emphasis	
	Computer Science Emphasis	
	Geology	Master of Science
Mathematics	Geology Emphasis	
	Mathematics	Master of Science
Medical Technology	Computational Science Emphasis	
	Mathematics Emphasis	
	Medical Technology	Master of Science
Physics and Astronomy	Medical Technology	Master of Science
	Physics	Master of Science
	Computational Science Emphasis	
	Physics Emphasis	
School of Polymers and High Performance Materials	Polymer Physics Emphasis	
	Polymer Science	Master of Science
	Polymer Science and Engineering	Master of Science
Science and Mathematics Education	Science Education	Master of Science
	Biology Education Emphasis	
	Chemistry Education Emphasis	
	Earth Science Education Emphasis	
	Physics Education Emphasis	

Department	Major	Degree
Doctoral Level		
School of Mathematical Sciences	Scientific Computing	Doctor of Philosophy
Biological Sciences	Biological Sciences	Doctor of Philosophy
	Biological Sciences Emphasis	
	Environmental Biology Emphasis	
	Marine Biology Emphasis	
	Microbiology Emphasis	
Chemistry and Biochemistry	Molecular Biology Emphasis	
	Chemistry	Doctor of Philosophy
	Biochemistry Emphasis	
School of Polymers and High Performance Materials	Chemistry Emphasis	
	Polymer Science and Engineering	Doctor of Philosophy
Science and Mathematics Education	Science Education	Doctor of Education
		Doctor of Philosophy
	Biology Education Emphasis	
	Chemistry Education Emphasis	
	Coastal Science Education Emphasis	
	Computer Science Emphasis	
	Earth Science Education Emphasis	
	Marine Science Education Emphasis	
	Mathematics Education Emphasis	
	Medical Technology Emphasis	
	Physics Education Emphasis	

College of Science and Technology

Robert Y. Lochhead, Dean
C. Howard Heiden, Senior Associate Dean
R. D. Ellender, Associate Dean
 Hattiesburg, MS 39406-5165
 (601) 266-4883

The College of Science and Technology offers degrees as outlined on the previous two pages. Please check each department/school section for specific admission, course, and graduation requirements as well as for descriptions of areas of specialization. In addition, present and prospective students should consult earlier sections of this Bulletin for the general Graduate School requirements and regulations that apply to all graduate programs and degrees.

The Center for Science and Mathematics Education, in cooperation with the Departments of Biological Sciences, Chemistry & Biochemistry, Coastal Sciences, Computer Science & Statistics, Geology, Marine Sciences, Mathematics, Medical Technology, and Physics & Astronomy offers the M.S., Ed.D., and Ph.D. degrees in Science and Mathematics Education with areas of specialization as indicated in the college's graduate degrees listing. These units also cooperate with the College of Education and Psychology to offer the course work to support the M.Ed. and Ed.D. in Secondary Education with various science and mathematics specialization areas.

The College offers an interdisciplinary minor in Environmental Science. Interested students may obtain a listing of the available courses from the chair of their department or graduate committee.

The faculty of the College of Science and Technology have organized numerous specialized centers and institutes, several of which address interdisciplinary issues. Brief descriptions of the principal ones follow.

Center for Macromolecular Photochemistry and Photophysics

David Creed, Coordinator
 Hattiesburg, MS 39406-5043
 (601) 266-4714

This Center was established in 1992 to promote closer cooperation and synergism amongst those faculty interested in the technologically important area of polymer photochemistry. The Center has mainly a coordinating function, particularly in such activities as inviting visiting speakers to the campus, continuing a program of in-house seminars and research discussions, promoting ties with industry, facilitating cooperative research projects, and purchasing and maintaining common research equipment. In 1995, the Center received funding from the National Science Foundation EPSCoR program for development activities including support of student research and visits by external seminar speakers and consultants. Faculty from the Departments of Chemistry and Biochemistry, Physics and Astronomy, and the School of Polymers and High Performance Materials currently participate in Center activities.

Center for Molecular and Cellular Biosciences

Gordon Cannon, Coordinator
 Hattiesburg, MS 39406-5043
 (601) 266-4221

The Center is composed of scientists with expertise in the disciplines of biochemistry, microbiology, molecular biology and molecular genetics. The Center facilitates research in these areas by means of a weekly Journal Club, which reviews the current literature, and the Distinguished Scientists Seminar Series, which brings world-renowned researchers to the Hattiesburg campus. In addition, the Center provides a forum for interaction among graduate and

undergraduate students working in the laboratories of the participating faculty. Faculty currently associated with the Center are members of the Departments of Biological Sciences, Chemistry and Biochemistry, Polymer Science, and Psychology.

Institute of Environmental Science

Desmond Fletcher, Director
Hattiesburg, MS 39406-5137
(601) 266-4896

The Institute of Environmental Science assembles teams of researchers from all disciplines as needed to undertake applied research in the areas of environmental studies and renewable energy resources. Providing environmental expertise to the community is another major function of the Institute.

Institute for Formulation Science

Robert Y. Lochhead, Director
Hattiesburg, MS 39406-0076
(601) 266-4868

The Institute for Formulation Science supports and coordinates research in formulation science. The Institute is an integral part of the College of Science and Technology and functions in concert with the School of Polymers and High Performance Materials.

Mississippi Polymer Institute

James Evans, Director
Hattiesburg, MS 39406-0003
(601) 266-4607

The Mississippi Polymer Institute was authorized by the Mississippi Legislature in 1983. The purpose of the Institute is to conduct research designed to support the rapidly growing polymer industry in Mississippi by building the infrastructure and providing technical assistance. The Institute is an integral part of the College of Science and Technology and functions in concert with the School of Polymers and High Performance Materials.

School of Engineering Technology

R. A. Cade, Director
Hattiesburg, MS 39406-5137
(601) 266-4895/4896

Adams, Ali, Anderson, Annulis, Applin, Blessé, Cade, Coates, Daughtry, Endt, Fletcher, Gaudet, Heiden, Herrod, Houston, Huffman, Juneau, Johnsey, Kemp, Leybourne, Lipscomb, Marchman, Mathis, Mitchell, Neal, Vajpayee, Wilder*

**Associate Graduate Faculty*

Master of Science in Engineering Technology

The School of Engineering Technology offers a program leading to the Master of Science in Engineering Technology with specialization in Construction, Electronics/Computer Systems, Industrial/Manufacturing Technology, Advanced Visualization, Workforce Training and Development, and Environmental Compliance and Safety. The degree can be obtained through research thesis, significant project, or coursework options. Advanced study in industrial use of computers includes Computer Aided Drafting (CAD), Computer-Aided Manufacturing (CAM), Computer Integrated Manufacturing (CIM), construction scheduling and estimating, robotics, and virtual reality design computing. Electronics and computer systems courses focus upon the introduction and implementation of state-of-the-art technology. Students are encouraged to develop degree plans that include technical electives in management, computer science, mathematics, environmental science, and related academic disciplines to prepare themselves for leadership roles in high technology industries.

Admission Requirements

For regular admission, students must have an undergraduate degree from an ABET accredited program or from a closely related program and a minimum 2.75 GPA. Students must submit test scores from the Graduate Record Examination (GRE) or Graduate Management Admission Test (GMAT) and two (2) letters of recommendation. Letters of recommendation should be from persons qualified to assess the applicant's readiness for graduate study and should be sent to the department or school. Students whose native language is not English must achieve a TOEFL score of 575 or more.

Conditional admission may be granted to students who do not meet requirements for regular admission. Students admitted on a conditional basis may be required to complete additional course work and must have a minimum GPA of 3.0 on the first nine hours of graduate courses 500 level or above or on all courses taken when meeting this nine (9) hour requirement in order to be granted regular admission.

Program Requirements

In addition to the degree requirements established by the Graduate School, students earning the Master of Science in Engineering Technology must satisfy the degree requirements listed below.

- 1) Students must select a degree option (thesis, project, or coursework) and develop a degree plan to be approved by a faculty adviser and the School of Engineering Technology Graduate Coordinator prior to the completion of more than nine hours of graduate work.
 - (a) **Thesis Option:** The thesis is intended to be a scholarly piece of research designed to expand the student's education in an area of engineering technology. This research must be conducted and defended before the student's graduate committee, and the final thesis report accepted by the USM Graduate Reader and the USM Graduate School. The thesis, when completed, receives six (6) graduate hours. The thesis option requires 30 hours total: 12 hours of core courses, 6 hours of thesis, and 12 additional hours (18 hours must be at the 600 level or higher). Students who elect to prepare a thesis should enroll in ENT 691, ENT 697, and ENT 698. Students are strongly encouraged to publish their work in engineering technology journals.(30 hours)
 - (b) **Project Outline:** The project is also intended to be a scholarly piece of research. The project must be conducted, written up, and defended before the student's graduate committee. The project is worth 3 graduate hours. The project option requires 33 hours total: 12 hours of core courses, 3 hours of project, and 18 additional hours (18 hours must be at the 600 level or higher). Students who select the project option should enroll in ENT 699 for project credit. Students are strongly encouraged to present their project work at engineering technology conferences (33 hours)
 - (c) **Coursework Option:** The coursework option requires 36 hours total: 12 hours of core courses and 24 additional hours.(18 hours must be 600 level or higher) (36 hours)
- 2) Students must satisfactorily complete 12 hours of core courses. These courses are determined after review of the student's application materials.
- 3) During the first year of graduate study, students must select a Graduate Committee comprised of three members of which two must be members of the graduate faculty of the School of Engineering Technology.
- 4) Students must perform satisfactorily on a comprehensive examination which is required for graduation. This exam is normally administered during the final semester of graduate work.
- 5) Students must maintain a cumulative GPA of 3.0 based on all graduate courses completed.

Master of Science in Workforce Training and Development

The School of Engineering Technology offers a program leading to the Master of Science in Workforce Training and Development. The program emphasizes both the research and theory framework as well as the practical application of workforce learning and performance. Students learn how to define and design training and non-instructional interventions that can improve performance at the worker, the work process, and the organizational levels. This program is designed to expand instructional opportunities beyond traditional boundaries. In addition to the traditional delivery of on-campus classes, some classes for this program are offered in a flexible format such as short courses, online courses, project-based courses, and coursework that combines electronic and campus-based delivery.



Admission Requirements

See masters admission requirements in this *Bulletin*.

Program Requirements

1. In addition to the degree requirements established by the Graduate School (30 hours with 18 hours at the 600 level), students earning the Master of Science in Workforce Training and Development must satisfy the degree requirements listed below.
2. Students must complete a project and develop a degree plan to be approved by a faculty adviser and the Workforce Training and Development Coordinator prior to the completion of more than nine hours of graduate work.
3. Students must satisfactorily complete 18 hours of core courses. These courses are determined after review of the student's application materials.
4. During the first year of graduate study, students must select a Graduate Committee comprised of three members of which two must be members of the graduate faculty of the School of Engineering Technology.
5. Students must perform satisfactorily on a comprehensive examination which is required for graduation. This exam is normally administered during the final semester of graduate work.
6. Students must maintain a cumulative GPA of 3.0 based on all graduate courses completed.

School of Mathematical Sciences

Grayson H. Rayborn, Director
Hattiesburg, MS 39406-5165
(601) 266-4739

The School of Mathematical Sciences comprises the Departments of Computer Science and Statistics, Mathematics, and Physics and Astronomy. In addition to the degree programs offered by the departments separately, they cooperate through the School of Mathematical Sciences to offer master's degrees with emphasis in computational science and the Doctor of Philosophy in Scientific Computing.

Master of Science Program—Emphasis in Computational Science

Students must be admitted to one of the three departments in the School according to their admission requirements. Students seeking this emphasis for a M.S. degree from any of the three participating departments will complete the common core by taking three of the four courses from each of the following departmental offerings:

Computer Science and Statistics

CSC 513 Algorithms
CSS 515 Mathematical Statistics I
CSC 625 Computer Graphics
CSC 636 Modeling and Simulation
MAT 610 Numerical Linear Algebra

Mathematics

MAT 560 Numerical Analysis
MAT 605 Ordinary Differential Equations
MAT 606 Partial Differential Equations

Physics and Astronomy

PHY 551 Physical Applications of the Fourier Transform
PHY 555 Fluid Dynamics
PHY 603 Statistical Physics
PHY 606 Methods of Mathematical Physics

The student must complete an additional nine (9) semester hours in the department which awards the degree as well as meet other requirements imposed by that department. To determine which nine (9) semester hours are needed and what other degree requirements must be met, the student should consult the department from which he or she wishes to receive the degree.

Doctor of Philosophy in Scientific Computing

Grayson H. Rayburn, Interim Director of the Center for Computational Science
Hattiesburg, MS 39406-10057
(601) 266-6516

A. Ali, D. Ali, Betounes, Burgess, Cade, Caveny, Cobb, Ding, Henry, Holyer*, Kolibal, Lee, Miller, Nagurney, Pandey, Paprzycki, Perkins, Rayborn, Seyfarth, Walls, Whitehead, Xie

Admission Requirements

Students expecting regular admission to the program should hold a bachelor's or master's degree in computer science, mathematics, physics, or a closely related field and possess a grade point average of at least 3.5 on all graduate work attempted. Prospective students should submit scores from the General section of the Graduate Record Examination and two letters of recommendation from persons qualified to assess the students readiness for doctoral study. Letters should be sent to the school.

Program Requirements

A minimum of eighty-four (84) graduate semester hours beyond the bachelor's degree or fifty-four (54) graduate semester hours beyond the master's is required for the degree. Students are expected to possess a reasonable proficiency at the undergraduate level in computer science, mathematics, and physics. Students not proficient may be required to take additional courses. All students in the program are required to complete a core curriculum consisting of the following courses:

- SC 710 Computational Methods for Physical Systems
- SC 720 Mathematics for Scientific Computing I
- SC 721 Mathematics for Scientific Computing II
- SC 730 Parallel Algorithms
- SC 740 Seminar (must be taken twice)

Other course requirements depend upon individual needs and are selected with the advice of the student's research director and doctoral committee.

Research Tool(s). See program coordinator for specific details.

Residency. Students must meet the residency requirements specified in this *Bulletin*.

Other Requirements

Students must meet the requirements of the Graduate School of the University of Southern Mississippi. They are required, additionally, to pass a comprehensive examination covering the core curriculum, to submit a formal prospectus (research proposal) that has been approved by the doctoral committee, and to present an acceptable copy of the dissertation to the doctoral committee at least fourteen (14) calendar days prior to the defense of the dissertation. This defense will take place at an advertised research seminar, open to members of the University community. (See Dissertation Deadline Schedule in front section of this **Bulletin**.)

The Comprehensive and Qualifying Examinations

To remain in good standing in the program each student, upon completion of the core curriculum, must take and pass a comprehensive examination. The examination, which is administered in the spring and fall of each year, consists of three sections covering the three corresponding areas of the core curriculum, and is prepared by a committee of scientific computing faculty. Students must register for the examination two months prior to the examination date and will have one, and only one, additional opportunity to pass the examination, retaking only those sections of the examination which they failed to pass at the first sitting. The opportunity to try the examination a second time must be exercised no later than the corresponding semester in the year immediately following the first attempt. Students failing to pass all sections of the examination after the second try will be dismissed from the program.

The qualifying examination is prepared by each student's graduate committee and is designed to determine whether or not the student is qualified to embark on dissertation research.



Department of Biological Sciences

Frank R. Moore, Chair
Hattiesburg, MS 39406-5018
(601) 266-4748

G. Anderson, Beckett, Bellipanni, Biesiot, Cotten, Curry, Ellender, Hairston, Howell, Kreiser, Luo, Matlack, Middlebrooks, Moore, Norris, Pessoney, Ross, Santangelo, Scheetz, Shearer, Wang

The Department of Biological Sciences offers graduate degrees with emphases in Environmental Biology, Marine Biology, Microbiology, and Molecular Biology. BSC courses cross-listed as MAR courses are generally taught at the University's Institute of Marine Sciences' Gulf Coast Research laboratory (GCRL), Department of Coastal Sciences (COA) at Ocean Springs, MS. COA faculty may function as a student's major professor.

Admission Requirements

Granting of regular admission to the Master of Science degree program or the Doctor of Philosophy degree program is based on several criteria, including but not limited to the following:

- 1) Undergraduate record (grade point average on undergraduate work in biological, chemical, and physical sciences). Regular admission to the Master's Degree Program requires a grade point average of 3.0 or higher on relevant undergraduate courses and a minimum 2.75 or higher on the last 60 hours of course work. Regular admission to the Doctoral Program requires a grade point average of 3.5 or more on all previous graduate work.
- 2) Submission of results from the General section of the Graduate Record Examination.
- 3) A writing sample (essay), stating research interests and career goals (required of both master's and doctoral applicants). The department will not begin its review of an application until this statement is provided. The statement is used in two ways in the admissions process. It provides a sample of the applicant's writing competency and communication skills, and it provides information concerning the compatibility of the applicant's interests with departmental research interests.
- 4) Letters of recommendation. At least two letters of recommendation are required from persons qualified to assess the applicant's readiness for graduate study. Applicants should arrange to have these letters sent to the department. The department will not begin its review of an application until letters of recommendation are provided.

Because more qualified applicants are received than can be accepted, admission to the department's program is very selective.

Conditional admission to departmental programs is considered only for students who meet Graduate School standards for conditional admission and who are sponsored by a member of the faculty of the department. The sponsor must provide a written statement indicating willingness to serve as the applicant's major professor.

Applications for admission for the fall and spring semesters will be reviewed by February 15 and September 15, respectively. All applications received after these dates will be considered if space is available, or will be placed in consideration for the next term. Applications for teaching assistantships will be considered beginning March 1.

Master of Science Program

Program Requirements

A minimum of thirty (30) graduate hours with a 3.0 GPA is required for this degree (18 hours must be at the 600 level or higher). Students must meet the general requirements set forth by the Graduate School of The University of Southern Mississippi. The following are major additional requirements:

- 1) Complete interviews with the Biological Sciences faculty by the end of the first semester.
- 2) Arrange for a major professor or temporary faculty sponsor by the end of the second semester.
- 3) Establish a three-member graduate thesis committee once a major professor and research area are chosen.
- 4) Submit a research prospectus approved by the graduate thesis committee.
- 5) Pass a written and/or oral comprehensive examination.
- 7) Present an acceptable copy of a thesis to the graduate thesis committee ten days prior to a public defense of the thesis at a research seminar presented at an advertised meeting. (See Thesis Timetable in front section of this *Bulletin*.)

Doctor of Philosophy Program

Program Requirements

A minimum of eighty-four (84) graduate hours beyond the bachelor's degree or a minimum of fifty-four (54) graduate hours beyond the master's degree is required. Students must meet the general requirements set forth by the Graduate School of the University of Southern Mississippi. The following are major additional requirements:

- 1) Arrange for a major professor or temporary faculty sponsor by the end of the second semester.
- 2) Establish a five-member doctoral committee by the beginning of the third semester.
- 3) The doctoral committee will consider the student's academic record and interview the student at a committee meeting to assess the student's ability to pursue additional graduate work by the end of the third semester of enrollment. This assessment fulfills the requirement for a qualifying examination.
- 4) Establish a program of study by the end of the fourth semester of enrollment in the doctoral program.
- 5) Research Tool(s). See department chair for specific requirements.
- 6) Pass a comprehensive examination consisting of written and oral sections that is administered by the doctoral committee. The comprehensive examinations should be taken by the end of the third year (sixth semester) of enrollment in the doctoral program.
- 7) Submit a formal prospectus (research proposal) to be approved by the doctoral committee.
- 8) Present an acceptable copy of the dissertation to the doctoral committee ten days prior to a public defense of the dissertation at a research seminar presented at an advertised meeting.
- 9) Residency. Students must meet the residency requirements specified in this *Bulletin*.

Department of Chemistry and Biochemistry

Robert C. Bateman, Chair
Hattiesburg, MS 39406-5043
(601) 266-4701

Bateman, A. Bedenbaugh, J. Bedenbaugh, Butko, Cannon, Creed, Crum*, Evans, Fawcett, Griffin, Heinhorst, Howell, Huang, Khanna, McMurtrey, Minn*, Pojman, Wertz*

*Associate Graduate Faculty

Admission Requirements

Applicants wishing to enter either the Master of Science degree program or the Doctor of Philosophy degree program within the department must satisfy the requirements for the Graduate School. Among those factors considered in the admission decision are the GPA, submission of test scores on the GRE, and two letters of recommendation from persons qualified to assess the candidate's readiness for graduate study. Letters should be sent to the department. Students whose native language is not English must achieve a score of 590 or above in the TOEFL exam.

Master of Science Program

The Department of Chemistry and Biochemistry offers the Master of Science degree with specialization in analytical, inorganic, organic, physical, biochemistry, or chemistry education. The M.S. programs jointly emphasize area course work and research/thesis.

Program Requirements

The master's program requires a minimum of thirty (30) hours with a 3.0 GPA (18 hours must be at the 600 level or higher). Placement examinations to identify deficiencies and to indicate remedial studies to remedy these deficiencies, participation in the seminar program, and a familiarity with computer programming are required for the M.S. degrees, along with specific but flexible coursework programs. Completion of a comprehensive examination in the student's area of specialization is also required.

Doctor of Philosophy Program

The Department of Chemistry and Biochemistry offers the Doctor of Philosophy degree with specialization in analytical, inorganic, organic, physical, biochemistry, and chemical education. The Ph.D. programs emphasize excellence in research. Qualified students holding a bachelor of science are encouraged to enter directly into the doctoral program. Individuals who are adequately prepared may take the qualifying examination at the beginning of their first semester of graduate work, but in no case can it be postponed beyond the second semester of graduate work.

Program Requirements

The Ph.D. programs require eighty-four (84) graduate hours beyond the bachelor's degree or fifty-four (54) graduate hours beyond the master's degree with a 3.0 GPA. Specific course requirements depend upon individual needs and are selected with the advice of the student's research director and doctoral committee.

Among other requirements are:

- 1) Completion and oral defense of a Research Prospectus;
- 2) Completion of a Ph.D. Comprehensive Examination;
- 3) Participation in the seminar program;
- 4) Research Tool(s).
The student's research director and doctoral committee will determine the research tools requirement, which is to be based on the student's background and goals.
- 5) Completion of a substantial research project and successful oral defense of a dissertation.
- 6) Residency. Students must meet the residency requirements specified in this *Bulletin*.

Department of Computer Science and Statistics

Adel Lofty Ali, Chair
Hattiesburg, MS 39406-5106
(601) 266-4949

D. Ali, Bisland, Burge, Burgess, Cobb, Demetron, Garraway, Miller, Nagurney, Paprzycki, Perkins, Rimes, Seyfarth,

The Department of Computer Science and Statistics offers the Master of Science degree in Computer Science and a Master of Science Degree in Computer Science with an Emphasis in Computational Science. Requirements for the Emphasis in Computational Science and the Ph.D. in Scientific Computing may be found in the School of Mathematical Sciences.

Master of Science Program in Computer Science

For the M.S. degree in Computer Science, a minimum of thirty-three (33) hours of graduate work is required. Of these hours at least 21 must be computer science courses (non-thesis/project) numbered 600 or above. In addition a student will complete either a thesis (6 hours) or a project (3 hours) in computer science. A 3.0 GPA is required for graduation.

The master's program is designed to provide a fundamental understanding of theoretical and applied computer science which will allow the student to begin exploring special topics and state-of-the-art subjects. It will prepare a student for advanced applications, development, and research positions in industry or for doctoral level studies.

Admission Requirements

In addition to meeting the entrance requirements set forth by the Graduate School of the University of Southern Mississippi, the student must be admitted by the departmental admissions committee on a regular or conditional basis. Students must submit scores on the **Graduate Record Examination** and transcripts of all undergraduate work. During the past year, successful applicants have had a mean GPA of 3.43. Applicants are required to submit three letters of recommendation by professionals in computer/computational science qualified to assess the student's readiness for graduate study. Letters should be sent to the department. In addition, applicants are encouraged to submit additional information which documents their potential for doing graduate work in computer/computational science. This would include industrial work experience and training and graduate work already completed. Students with minor deficiencies may be granted conditional admission.

For students who do not come from an undergraduate program where the courses clearly equate with the USM courses, the graduate admissions committee will review a student's transcript and decide what, if any, deficiencies can be met with undergraduate courses. A student will not be granted regular admission to the computer/computational science graduate program until those deficiencies are met. See the general policies of the Graduate School for further requirements of conditional admission for students.

Credit will NOT be given toward the master's degree for any course taken to meet deficiencies, admission requirements, or for undergraduate prerequisite courses.

The student must select a three-person advisory committee. The chair of this committee must be from the Department of Computer Science and Statistics (one member may be from outside the Department of Computer Science and Statistics)

Program Requirements

- 1) Completion of prerequisites. A student applying for admission will normally have a B.S. degree from a computer science or closely-related program. Minimum coursework required for admission includes the equivalent of CSC 101, 102, 203, 204, 205, 306, 307, 308, 414, and three courses from among the following: CSC 305, 410, 411, 412, 413, and 415 (see the USM Undergraduate and Graduate Bulletins for course descriptions) and mathematics through integral calculus, basic probability, discrete math, and linear algebra.
- 2) Completion of CSC 513 if the student has not completed CSC 413.
- 3) Completion of 33 hours of graduate course work to include a set of core courses (CSC 616, CSC 623, CSC 626), and three courses from among the following: CSC 620, CSC 624, CSC 632, CSC 633, and CSC 638. Students may substitute CSC 620 for CSC 616, in the set of core courses, if they have credit for the equivalent of CSC 415.
- 4) Satisfactory completion of a thesis (6 hours credit) or a project (3 hours credit).
- 5) Satisfactory completion of a final comprehensive examination.
- 6) A 3.0 GPA is required for graduation.

M.S. in Computer Science with an Emphasis in Computational Science

The department also awards an M.S. degree with an emphasis in computational science. A degree plan for this emphasis area must include a common core of courses taken from the departments of Computer Science and Statistics, Mathematics, and Physics. Details on the common core are specified in the computational science emphasis area listed under the School of Mathematical Sciences. Nine (9) additional hours of Computer Science courses must be taken.

Admission Requirements

See admissions requirements in the above section.

Program Requirements

- 1) Completion of prerequisites. A student applying for admission will normally have a B.S. degree from a computer science, mathematics, physics, or closely-related program. Minimum coursework required for admission includes the equivalent of CSC 101, CSC 102, CSC 307, MAT 385, MAT 326, and PHY 351 or PHY 361.
- 2) Completion of at least 36 hours of graduate work with a 3.0 GPA (18 hours must be at the 600 level or higher)
- 3) Completion of the Computational Science core courses listed under the School of Mathematical Sciences in this Graduate Bulletin.
- 4) Satisfactory completion of a comprehensive examination.



Department of Geology

Gail S. Russell, Chair
Hattiesburg, MS 39406-5044
(601) 266-4526

Bennett, Dunn, Meylan, Orsi*, Patrick, Pope, Russell, Skilling, Smith**

**Associate Graduate Faculty*

The Department of Geology offers a program leading to the Master of Science degree in Geology. The curriculum is designed to provide both a thorough understanding of geology as preparation for employment as a professional geologist or for doctoral studies and to provide specialization in a selected area of research. The Department of Geology at The University of Southern Mississippi emphasizes both the importance of a field-based education and the application of new technologies to geologic investigations. The Department of Geology collaborates with the Center for Science and Mathematics Education in programs leading to the M.S., Ph.D., and Ed.D. with an emphasis in Earth and Environmental Education.

Admissions Requirements

Admission is based on grade point average (GPA), letters of recommendation from persons qualified to assess the applicant's readiness for graduate study (letters should be sent to the department), and submission of results on the Graduate Record Examination (GRE). Both the overall GPA and a GPA calculated for courses (excluding special problems courses) in geology and other sciences, mathematics, computer science and statistics will be considered. Applicants who do not have degrees in geology will be considered for admission but will be required to remedy any deficiencies, including geology field camp, compared to the courses required for the B.S. in Geology at The University of Southern Mississippi. Students who are not admitted as regular graduate students may be considered for conditional admission (minimum GPA requirements are in front section of this **Bulletin**).

Program Requirements

A minimum of thirty (30) graduate hours with a 3.0 GPA, including six (6) hours of thesis credit is required. The remaining twenty-four hours must be geology courses excluding GLY 692 "Special Problems in Geology" or similar courses and must include at least 18 hours at the 600 level. Entering students are required to take two (2) hours of seminar. The student must complete an original research project, submit and defend a thesis, and pass a final comprehensive examination. A thesis committee which supervises these activities is established when the student is formally admitted to degree candidacy.

If graduate students have not already taken the exam required to qualify as a Registered Professional Geologist in Mississippi or the equivalent exam for another state, they must take it as a requirement for the M.S. degree in Geology.

Department of Mathematics

Wallace Pye, Chair
Hattiesburg, MS 39406-5045
(601) 266-4289

Betounes, Boyd, Contreras, Ding, Doblin, Fay, Hornor, Joubert, Kolibal, Piazza, Pye, Redfern, Ross, Stuart, J. Thrash, Van Niekerk*, Walls, Xie*

**Associate Graduate Faculty*

The Department of Mathematics offers the Master of Science degree with emphases in mathematics and computational science. It also offers, through the Center for Computational Sciences, the Doctor of Philosophy degree in Scientific Computing with an emphasis in Computational Mathematics and, through the Center for Science and Mathematics Education, the Doctor of Philosophy degree in Science Education with an emphasis in Mathematics.

Admission Requirements

Regular admission to the M.S. programs in mathematics requires that the applicant satisfy the general admission and academic requirements for all M.S. programs at the University as set forth in this **Bulletin**. In addition, in evaluating applications, the admission committee utilizes these criteria:

- 1) The undergraduate record indicates that the applicant satisfies the present undergraduate requirements for a major in mathematics at the University of Southern Mississippi;
- 2) Applicants must include scores from the General Test of the **Graduate Record Examination** (GRE);
- 3) The application includes three letters of recommendation from persons qualified to assess an applicant's readiness for graduate study (letters should be sent to the department) and a current resume;
- 4) Applicants whose native language is not English must achieve a TOEFL score of 580 or more.

The department chair can recommend conditional admission for an applicant whose credentials strongly meet all regular admission requirements save one. This student must then meet all conditional admission requirements as set forth in this **Bulletin** as well as any additional requirements imposed by the chair.

Requirements Common to All Master of Science Emphases

Before completing one semester of graduate work, the student should select a three-person advisory committee from the graduate faculty. The student, with the help of his or her academic adviser, should prepare an "Application for Approval of Graduate Program" form. The adviser will

distribute copies to the graduate faculty, the student's advisory committee, the department chair, the departmental file, and the applicant. Subsequent changes in the program must be approved by the department chair and all three committee members.

Each candidate for the master's degree will be expected to demonstrate mastery of subject matter on the Master's Comprehensive Examinations. These examinations consist of two parts: a written examination and an oral examination. The written examination's content is dependent on the program emphasis and thesis option. The oral examination may cover all course work, including courses taken as an undergraduate. These examinations must be successfully completed two weeks prior to graduation.

The student who desires to write a thesis must select a graduate faculty member who agrees to serve as thesis director. Prior to beginning the thesis, a student must submit (for approval to his or her advisory committee) a prospectus, the guidelines for which are available in the departmental office.

M.S. in Mathematics

Program Requirements

The student must enroll in the two-semester advanced calculus sequence at the graduate level at the beginning of the graduate program if the equivalent of this sequence was not included in the student's undergraduate preparation. Neither course can be used to satisfy any part of the minimum hour requirement for the master's degree, and a grade of B or above must be earned in each of the two courses.

The following minimal requirements must be included in the program:

- 1) 33 hours of graduate course work beyond the equivalent of a USM undergraduate degree in mathematics.
- 2) 21 hours of courses numbered above 600.
- 3) 18 hours of mathematics courses numbered above 600, which includes MAT 689 I and II (Mathematics Seminar I and II).
- 4) 3.0 GPA to graduate
- 5) Comprehensive Examination

NOTE: Subject to approval of the department chair and the student's advisory committee, an outside minor consisting of 9 semester hours may be used as a portion of the 33-hour program.

Courses offered by the department are grouped into seven areas. The student should select a suitable balance in at least three of these seven areas. The written exam will cover the content of two courses (selected by the advisory committee in consultation with the student) from each of the student's three areas of specialization. The student whose thesis prospectus has been approved need select only two areas of specialization (other than the one in which the thesis is written). The written exam will cover the content of two courses from each of these two areas. The oral examination will then consist primarily of a defense of the thesis.

Seven Specialty Areas

1. Topology/Geometry: 572, 575, 601, 683
2. Analysis: 536, 636, 682
3. Algebra and Linear Algebra: 521, 523, 524, 526, 603, 610, 681
4. Optimization and Numerical Analysis: 518, 519, 560, 561, 610, 685
5. Real Analysis and Probability: 520, 641, 642
6. Combinatorics and Graph Theory: 537, 539, 629
7. Applied Analysis: 515, 517, 520, 605, 606, 684, 685

M.S. in Mathematics with an Emphasis in Computational Science

Program Requirements

This multidisciplinary degree program requires that the student complete a 27 hour core (three courses from each of the three disciplines: computer science, mathematics, and physics) and an additional 9 hours in mathematics. The student must enroll in the two-semester advanced calculus sequence at the graduate level at the beginning of the graduate program if the equivalent of this sequence was not included in the student's undergraduate preparation. Neither course can be used to satisfy any part of the minimum hour requirement for the master's degree, and a grade of B or above must be earned in each of the two courses. The student who has been awarded an assistantship must also include 6 hours of mathematics seminar in his or her program. These minimum requirements are as follows:

- 1) Core (27 hours) Please see the Center for Computational Sciences section of this *Bulletin*.
- 2) MAT 689 I and II (Mathematics Seminar I and II) are required of those students who receive an assistantship.
- 3) MAT 561 (Numerical Analysis II) plus six additional hours to be chosen from: MAT 629, 684, 685, and the remaining MAT core course.
- 4) 3.0 GPA to graduate
- 5) Comprehensive Examination

The master's comprehensive exam will cover the content from six courses: MAT 560, 561; two courses from MAT 605, 606, 685; and two courses from MAT 610, 629, 684.

Department of Medical Technology

M. Jane Hudson, Chair
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Beck, Hall, Hudson, Lux

Master of Science Program

The Master of Science in Medical Technology degree programs seek to provide the student with skills and knowledge for professional enhancement. Graduates of the programs may be candidates for positions as laboratory managers, education coordinators, hospital or college/university medical technology faculty members, researchers, departmental supervisors, etc. The program is structured to provide the student with an area of emphasis.

The Department of Medical Technology offers two programs leading to the Master's degree in Medical Technology. One program is for the individual who possesses certification as a medical technologist from a recognized national certifying agency. This certification is an entrance requirement.

The second program is for the individual who does not hold certification as a medical technologist from a recognized national certifying agency. This program includes a medical technology practicum that allows the individual to become eligible to take a national certification examination. To exit this program, the student must make a score on a nationally recognized certification examination that is deemed satisfactory by the graduate Medical Technology faculty.

Admission Requirements

For both programs, in addition to meeting the general requirements of the Graduate School and University as stated in this Bulletin, the applicant must submit scores from the GRE and two letters of recommendation. Letters of recommendation should be from persons qualified to assess the applicant's readiness for graduate study and should be sent to the department or school. Students admitted will receive either regular or conditional admission, as described earlier in this **Bulletin**. Students admitted on conditional basis must make a grade point average of at least 3.00 the first semester on specific courses designated by the department faculty (specifically on the first nine (9) hours of course work numbered 500 or above or on all course work taken while completing this nine (9) hour requirement). Regardless of previous college experience, if English is not the native language of any student, evidence of English proficiency must be provided prior to admission into the graduate program. The MTELP (Michigan Test of English Language Proficiency) requirement is "Proficiency II" and is preferred by the department. Alternatively a TOEFL of 550 may be accepted. In addition, a score of 4 ("functional language skills") must be earned on a fluency test administered by the English Language Institute. This fluency test is specifically designed to determine listening and speaking skills with respect to situations and language expected during the practicum phase of the program.

To receive maximum consideration, graduate applications for the Fall semester should be received by the department by April 15, and applications for the Spring semester should be received by November 1.

Program Requirements

A minimum of thirty (30) semester hours of course work, excluding hours awarded for thesis, is required for the thesis option. A minimum of thirty-six (36) semester hours of course work is required for the non-thesis option. In addition, individuals who do not hold certification at admission must complete a practicum of forty-seven (47) hours. A minimum of eighteen (18) semester hours must be in courses numbered 600 or above. The courses should interrelate and be directed toward an area of emphasis. An area of emphasis such as microbiology, chemistry,

hematology, immunology, management, or education will be chosen by the student, and all course work designated and approved by the student’s graduate committee during the first semester of the program. Students selecting the thesis option are required to write a thesis under the direction of a Medical Technology department faculty member on a subject approved by the student’s graduate committee. The student’s graduate committee is composed of a chair and two members recommended by the department chair and appointed by the Graduate Dean. Courses in which a student receives less than a “C” will not be counted toward the degree. A student may not have more than two practicum courses and two other courses with a grade of “C” or below. Upon completion of course work, all students must pass oral and written comprehensive examinations. Additionally, student selecting the thesis option must successfully present an oral defense of the master’s thesis. Students must have at least a 3.0 GPA to graduate.

Non-major masters students must obtain permission of the instructor to register for MTC 502, 502L, 504, 504L, 506, 506L, 515. Registration for practicum level courses is limited as described in this Bulletin.

Department of Physics and Astronomy

Joe B. Whitehead, Jr., Chair
 Hattiesburg, MS 39406-5046
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Folse, Hughes, Lee, Mead, Pandey, Rayborn, Sirochman, Whitehead

The Department of Physics and Astronomy offers a program leading to the Master of Science degree with a major in Physics. The curriculum is designed to provide students with knowledge of both the fundamental areas of physics as well as selected applied physics topics. Research areas from which a thesis may be chosen include Digital Signal Processing, Acoustics, Viscous Fluid Flow, Turbulence/Chaos, Mathematical Physics, Statistical Mechanics, Many-Body Methods in Nuclear and Condensed Matter, Polymer Physics, Liquid Crystal Physics, and General Quantum Field Theory.

In addition to the traditional master’s program in physics, the department also offers emphasis areas in Polymer Physics and Computational Science. The latter is a 36 semester hour interdisciplinary program offered in cooperation with the Department of Mathematics and the Department of Computer Science and Statistics.

Admission Requirements

Admission to the Master of Science Program is based upon several factors including a student’s previous academic performance, recommendation letters (minimum of two), and scores on the Graduate Record Examination (GRE). Letters of recommendation should be from persons qualified to assess the applicant’s readiness for graduate study and should be sent to the department or school. A score of 540 on the TOEFL examination is required of those applicants for whom English is not their native language. Prospective graduate students should have completed mathematics through differential equations, and satisfactorily completed courses in introductory physics, mechanics, electricity and magnetism, modern physics and quantum mechanics at the undergraduate level. Students with inadequate preparation may be admitted on a conditional basis but will be required to complete make-up courses with a grade of B or better. To remove Conditional Admission status, masters students must earn a 3.0 on the first nine (9) semester hours of course work numbered 500 or above or on all course work taken while completing this nine (9) hour requirement. It is recommended, but not required, that students applying for a stipend take the Advanced Physics GRE.



Master of Science Program in Physics

Program Requirements

- 1) Completion of a minimum of thirty (30) hours of graduate work with a 3.0 GPA. (18 hours must be at the 600 level or higher)
- 2) Completion of the Physics Core courses:
 PHY 601, 602, 603, 65012 hours
- 3) PHY 689 (I, II, III, IV): Physics Seminar4 hours
- 4) Satisfactory completion of a Comprehensive Examination
- 5) Development and completion of an original research project, thesis, and oral defense:
 PHY 698: Thesis6 hours
- 6) Electives8 hours

M.S. Program in Physics with an Emphasis in Polymer Physics

Program Requirements

Students choosing this optional program to the M.S. in Physics must have successfully completed at least one full year of General Chemistry with Laboratory and it is strongly recommended that one semester of Organic Chemistry be taken for credit. Attendance at relevant seminars in the School of Polymers and High Performance Materials is required.

- 1) Completion of a minimum of thirty (30) hours of graduate work with a 3.0 GPA. (18 hours must be at the 600 level or higher)
- 2) Completion of the Physics Core for the Polymer Option:
PHY 601, 602, 603, 650, 689 (I, II, III).....15 hours
- 3) Polymer Science coursework (at least 9 hours from the following):
PSC 710, 711, 712, 730, 811, 8129+hours
- 4) Satisfactory completion of a Comprehensive Examination
- 5) Development and completion of an original research project, thesis, and oral defense
PHY 698: Thesis (in the area of Polymer Physics)6 hours

M.S. Program in Physics with Emphasis in Computational Science

Program Requirements

- 1) Completion of at least thirty-six (36) semester hours of graduate work with a 3.0 GPA. (18 hours must be at the 600 level or higher)
- 2) A degree plan for this M.S. option must include at least three (3) courses from each of the three supporting disciplinary areas which make up the Computational Science Program. These core courses are listed under the School of Mathematical Sciences in this **Graduate Bulletin**...27 hours
- 3) Additional hours of Physics courses to be taken must include the following:
PHY 601, 602, and 650.....9 hours
- 4) Satisfactory completion of a Comprehensive Examination
- 5) Attendance at seminars in the Department of Physics is strongly recommended

School of Polymers and High Performance Materials

Robert Y. Lochhead, Chair
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Guymon, Hester, Hoyle, Lochhead, Mathias, Mauritz, McCormick, Moore, Storey, S. Thames, Urban

The School of Polymers and High Performance Materials offers programs at the master's and doctoral levels. Curricula are designed to provide both a fundamental understanding of polymer chemistry and engineering and advanced courses dealing with special topics and state-of-the-art subjects. Both the M.S. and Ph.D. degrees require extensive research in areas involving basic investigations and developments applied to current and future problems of our society and world.

Master of Science Program

Admission Requirements

Admission to the master's program is based upon previous academic performance and scores on the General section of the Graduate Record Examinations. Requirements include the following: a minimum grade point average of 2.75 or better on the last 60 hours of undergraduate work, a 3.0 GPA in major, two letters of recommendation from persons qualified to assess the applicant's readiness for graduate study (letters should be sent to the school), and submission of scores on the GRE.

Program Requirements

Specific details of the admission and program requirements are outlined in a separate Handbook provided by the School of Polymers and High Performance Materials.

Graduation is based upon:

- 1) Completion of 54 hours of graduate work including the 21 hours of PSC core courses with a GPA of 3.0 or better. (18 hours must be at the 600 level or higher)
- 2) Satisfactory development of an original research project and a thesis.
- 3) Satisfactory completion of the final comprehensive examination.

Required Coursework

PSC 701, 702, 710, 711, 720, 721, 730, and 703 or 712.....	21 hours
PSC 691, 698: Research in Polymer Science and Thesis	10-45 hours
PSC 789: Polymer Science Seminar	2-6 hours

Doctor of Philosophy Program

Admissions Requirements

The school admits students only to the master's program because of the diversity of entering students' backgrounds. Demonstrated excellence is required in coursework and examinations before a student is allowed to enter the doctoral program. Admission of students with previous graduate coursework or master's degrees from other institutions will be considered on an individual basis.

Regular admission to advanced standing requires (1) obtaining a minimum GPA of 3.0 on the 26 hours of core courses; (2) obtaining a minimum GPA of 3.5 in at least 30 hours of graduate courses taken at USM including the core courses and research; and (3) passing all three sections of the written comprehensive examination. In addition, a student's transcript must show no more than two grades lower than a "B" in the first 26 hours of core courses. There is no option for conditional admission for advanced study.

Additional requirements for the Ph.D. degree dealing with residency, the research tools, the committee, the dissertation, the dissertation defense, application for candidacy and graduation are described elsewhere in this **Bulletin**.

Program Requirements

Specific details of the admission and program requirements are outlined in a separate Handbook provided by the School of Polymers and High Performance Materials.

Minimum course requirements for the doctorate are seventy-eight (78) semester hours not including research tools and dissertation. Fifty-four (54) semester hours are required beyond a master's degree in Polymer Science or a related area. Doctoral students must take all core courses (PSC 701, 702, 703, 710, 711, 712, 720, 721, 730, 740) as well as two 800-level courses that are offered. Graduate students must register for one hour of polymer science seminar (PSC 789) each semester that they are in residence. A 3.0 GPA is required for graduation.

Qualifying Examination

This examination is taken during the first week prior to the student's first semester of graduate work. It requires a minimum proficiency in organic and physical chemistry.

Research Tool(s)

See department chair for specific requirements.

Residency

Students must meet the residency requirements specified in this *Bulletin*.

Comprehensive Examination

The written comprehensive examination is given once a year at the beginning of the summer term. This three-part examination covers the areas of organic, physical, and practical polymer science. A student who fails any part of the examination must retake and pass that part at the end of summer term. Only one additional attempt is allowed.



Dissertation Prospectus

Within 9 months of completing the written comprehensive examination, a written dissertation prospectus which includes an annotated bibliography must be approved by the student's committee. The prospectus summarizes the student's work accomplished to date and gives an outline of research objectives for the dissertation project.

Proposition Presentation and Oral Defense

Within 18 months of completing the comprehensive examination, the student must submit an independently conceived and developed written proposal dealing with an original proposition unrelated to his or her dissertation research. This proposal is then presented orally and defended before the faculty. Oral evaluation of the student's general knowledge of polymer science is carried out concomitant with his or her defense of the proposal.

Center for Science and Mathematics Education

Susan Ross, Director
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Affiliates: A. Bedenbaugh, J. Bedenbaugh, Bellipanni, R. Cade, Cameron, Contreras, Cotten, Curry, Dunn, Feldman, Garraway, Hairston, Howell, Hudson, Huffman, Hughes, Johnson*, Kersh, Lochhead, Mattson, McKee, Pandey, Peggion, Pope, Ross, Russell, Scheetz, Scott, Sirochman, Simmons, J. Thrash, Walker, Walls, Wiesenburg, Willems*

**Associate Graduate Faculty*

The Center for Science and Mathematics Education, recognizing the national goal of improving the delivery of science instruction and the accompanying demand for individuals with advanced degrees in science education, provides programs for the Master of Science, Doctor of Philosophy, and Doctor of Education degrees in Science Education.

Master of Science Program

The program of study at the master's degree level is designed to increase the professional competency of science teachers and to provide the course work necessary to meet standards of teaching certification at this advanced level. The Master of Science Education degree is offered with an emphasis in biology, chemistry, earth and environmental sciences, or physics. The program outcomes expressed in terms of student learning include demonstration of (a) graduate-level mastery of knowledge in the student's selected emphasis area; (b) the ability to integrate content knowledge into curricular, instructional, and assessment strategies for students at different educational levels; (c) the ability to formulate, implement, and sustain changes in reforming science education to meet national standards at a school level.

Admission Requirements

In addition to the general admission and academic requirements for all graduate programs as set forth in this **Bulletin**, regular admission to the Master's program in Science Education requires a bachelor's degree in any area of science (or combination of science and professional education) and a minimum grade point average of 3.0 in undergraduate study. A Mississippi Department of Education Class A License is required if advancement to a Class AA License is desired. Applicants are required to present to the Center Director for consideration verbal and quantitative scores on the Graduate Record Examination, three letters of recommendation from persons qualified to assess the applicant's readiness for graduate study (letters should be sent to the center), and a one- to two-page statement of the applicant's teaching philosophy in the areas of knowledge to be addressed, teaching methodology, and assessment.

Students who fail to meet the criteria for regular admission may be considered for conditional admission if the Program Admissions Committee, Center Director, Dean of the College, and Dean of the Graduate School are satisfied that the applicant shows promise of successfully completing graduate degree requirements. Regular admission will be granted with the completion of nine (9) semester hours of USM graduate work (500 level or higher) with a minimum of a B average on all courses taken while completing this nine (9) hour requirement, the removal of deficiencies, and a positive recommendation of the student's adviser.

Program Requirements

The Master's degree requires a minimum of thirty-four (34) semester hours of graduate work with a 3.0 GPA as specified below (18 hours must be 600 level or higher)

- (a) A minimum of twelve (12) semester hours in a science emphasis area—biology, chemistry, earth and environmental sciences, or physics.
- (b) Nine (9) semester hours in a related discipline.
- (c) Six (6) semester hours in professional education (REF 601 and REF 607 if seeking AA certification in the State of Mississippi).
- (d) Seven (7) semester hours in science education (including SME 601 and limiting hours of special problems to 3 semester hours).

By the end of the second semester, the student should arrange through the Center Director for the appointment of a three-member graduate committee by the Dean of the Graduate School. To graduate, students must complete an approved program of studies with a 3.0 grade point average, compile and submit a portfolio showing evidence of mastery of the program learning outcomes, and pass an oral comprehensive examination. The student's graduate committee will be responsible for monitoring the student's progress, administering the comprehensive examination, and determining if all criteria have been met for graduation.

Doctor of Philosophy and Doctor of Education Programs

The Center for Science and Mathematics Education offers programs leading to the Doctor of Philosophy and Doctor of Education degrees in Science Education with emphasis in biology, chemistry, coastal science, computer science, earth and environmental sciences, marine science, mathematics, medical technology, or physics.

Within the framework of the overall curriculum requirements, programs are planned to accommodate the professional goals of the individual graduate student. For students holding Class AA certification from the Mississippi State Department of Education, the doctoral program in each emphasis except mathematics and computer science area can be planned to provide for Class AAAA advanced certification if desired. Graduates of the program are prepared as candidates for teaching positions at the secondary school, community college, and senior college levels as well as positions in curriculum supervision, curriculum development, educational research, and the informal delivery of education in their chosen discipline.

Admission Requirements

In addition to the general admission and academic requirements for all graduate programs as set forth in this *Bulletin*, regular admission to the doctoral program in Science Education requires a master's degree, a Class AA teaching certificate in one of the emphasis areas if an advance in certification to Class AAAA is desired, three years of teaching experience at the secondary or college level, and a minimum GPA of 3.5 for all previous graduate work. Applicants are required to present for consideration verbal and quantitative scores on the Graduate Record Examination, three letters of recommendation, and a letter of intent expressing academic, professional, and research goals to the Center Director. Letters of recommendation should be from persons qualified to assess the applicant's readiness for graduate study and should be sent to the center.

Initial admission to the program will be conditional for all students. Students are expected to possess proficiency at the undergraduate level in the chosen emphasis for advanced study. Students not proficient may be required to take additional undergraduate courses. Regular status will be granted with the completion of 12 semester hours of USM graduate courses numbered 600 level or higher with a 3.25 GPA, a positive recommendation of the Center Director, the removal of any deficiencies, and acceptable performance on the qualifying examination.

Program Requirements

The doctoral degree in science education requires a minimum of fifty-seven (57) semester hours of graduate work beyond the master's degree, excluding the hours for the dissertation and foreign language requirements, as specified below.

- (a) Twenty-four (24) semester hours in a content area with a minimum of 15 hours in an emphasis discipline.
- (b) Twenty-four (24) semester hours in science education including 3 semester hours of seminar, 3 semester hours of SME 691, with a maximum of 9 semester hours of SME 791 and a maximum of 3 semester hours of SME 792.
- (c) Nine (9) semester hours of electives to be chosen from science education, emphasis discipline, or related discipline and with a minimum of 3 hours in professional education

Research Tool(s)

Additional requirements include demonstrated proficiency in educational statistics, proficiency in a foreign language if pursuing the Ph.D., and independent research culminating in an acceptable dissertation. The research may focus on a problem in the student's emphasis area that is related to the teaching/learning of the discipline or a more general educational research problem.

Qualifying Exam

The department requires a written qualifying examination. This examination is designed to assess both the student's fitness to pursue doctoral work and to provide diagnostic information to the student's committee in planning a program. The student's program will be directed by a five-member graduate committee consisting of two faculty members affiliated with the center for Science and Mathematics Education, one from the emphasis discipline, one from educational research, and one open for selection according to the student's research focus. The committee will approve the student's program plan and dissertation prospectus, and conduct the comprehensive examination, which is administered near the completion of the student's course work. Upon acceptance of the dissertation by the student's committee and at least four weeks prior to graduation, a final oral examination in defense of the candidate's dissertation will be administered. Furthermore, it is required that a report presenting the candidate's research be prepared and submitted to a refereed journal for publication.

Residency

Students must meet the residency requirements specified in this *Bulletin*.