The James Worth Bagley College of Engineering

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General Information

The James Worth Bagley College of Engineering is a professional college whose purposes are to provide both undergraduate and graduate education, to conduct basic and applied research, and to engage in outreach and public service activities. The Bagley consists of the following academic departments:

- Department of Aerospace Engineering
- Department of Agriculture and Biological Engineering
- Dave C. Swalm School of Chemical Engineering
- Department of Civil and Environmental Engineering
- Department of Computer Science and Engineering
- Department of Electrical and Computer Engineering
- Department of Industrial and Systems Engineering
- Department of Mechanical Engineering

In addition to these academic departments, the Bagley College offers opportunities for faculty and student research in the following centers:

- Center for Advanced Vehicular Systems (CAVS)
- CAVS Extension
- Center for Computer Security Research
- Center for Cyber Innovation
- Computational Simulation and Design Center
- Distributed Analytics and Security Institute (DASI)
- Geosystems Research Institute (GRI)
- High Voltage Laboratory
- High Performance Computing Collaboratory (HPCC)
- Industrial Assessment Center
- Institute for Clean Energy Technology (ICET)
- Institute for Genomics, Biocomputing, and Biotechnology (IGBB)
- Institute for Imaging and Analytical Technologies
- Institute for Neurocognitive Science and Technology
- Institute for Systems Engineering Research (ISER)
- Microsystems Prototyping Laboratory
- Mississippi Transportation Research Center
- Northern Gulf Institute (NGI)
- Raspet Flight Research Laboratory

- Southeast Cooling, Heating, and Power (CHP) Applications Center
- Sustainable Energy Research Center

The vision of the Bagley College of Engineering is to be known for excellence in scholarly achievement, innovative engineering solutions, and economic and educational outreach that enhances the quality of life across the globe.

It is the mission of the Bagley College of Engineering to provide a world-class research, outreach and educational environment that supports, cultivates and fosters the talents of students, faculty and staff to discover new knowledge and technology for the benefit of society. To accomplish this mission the College has established the following goals:

1. Foster a professional environment that cultivates and enhances our faculty members' scholarly knowledge base and supports them in building an accomplished academic reputation for themselves and the college.
2. Provide engineering graduates who, through their excellent technical and leadership skills, cultural awareness, and social responsibility, will solve the challenges of the 21st century.
3. Increase engineering opportunities for underrepresented groups to support and serve the diverse demographic of the state of Mississippi and the nation to ensure that the college encourages a variety of input, influences and participation in all its endeavors.
4. Conduct cutting edge research to enhance the quality of human life and earth's sustainability.
5. Provide engineering expertise, engagement and outreach to create positive change and economic development in Mississippi and the region.

The Bagley College is dedicated to providing an extraordinarily rich environment where engineering students can gain the skills that will allow them to become leaders and builders in commerce, industry, and government. Through innovations in and enhancements to the curriculum housed in the Center for Engineering Student Excellence, Bagley engineering graduates will:

1. Develop effective communications skills;
2. Fully utilize the computer as a productivity tool;
3. Develop effective leadership and teamwork abilities;
4. Understand the entrepreneurial process; and
5. Comprehend the global business environment.

These enhancements ensure that Bagley engineering graduates are highly sought after by employers, well prepared for graduate and professional schools, and will continue to be successful throughout their careers.

The Bagley College also includes a study abroad program which provides students with an opportunity to take courses in another country and experience different cultures. This experience broadens the vision of those who participate and increases their awareness of the global environment in which engineers work. Engineering students also have the opportunity to apply for Congressional internships. Currently internships are in place for the U.S. Congress in Washington, D.C.

In addition to study abroad and Congressional internships, the Bagley College offers its own minor in Global Engineering Leadership and fully participates in the university's Leadership Studies minor. Through these programs, engineering students are provided an opportunity to develop their leadership and management skills through both general leadership courses and courses focused on skills specific to leadership in the engineering profession. More information on each of these can be found in this catalog. Students pursuing either of these minors should should consult with their academic advisor as early as possible so that course work can be adequately planned.

The Bagley College is dedicated to producing outstanding graduates who are capable of achieving excellence. With a strong focus on engineering fundamentals and an attitude among the faculty of helping each student achieve his or her best, Bagley engineering graduates are ready to obtain positions with the leading companies or further their educations at the finest graduate and professional schools in the nation.

Basic-level professional programs leading to the Bachelor of Science degree are offered in Aerospace Engineering, Biological Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Computer Science, Electrical Engineering, Industrial Engineering, Mechanical Engineering, and Software Engineering. The Bachelor of Science programs in aerospace, biological, chemical, civil, computer, electrical, industrial, mechanical and software engineering are accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org , and the B.S. in computer science is accredited by the Computing Accreditation Commission of ABET, http://www.abet.org .

All basic-level engineering programs are designed to give the student an understanding of the fundamental principles underlying engineering science and engineering practice. Each curriculum consists of four sequences: Basic Sciences and Mathematics; a general education component; Engineering Sciences; and Engineering Analysis, Design and Systems.

Included in the Basic Sciences and Mathematics sequence are Biology, Chemistry, Physics, and Mathematics, through Calculus and other advanced mathematics topics.

There is also a General Education component required for graduation which is also published in this bulletin.

The sequence in Engineering Sciences consists of studies in engineering mechanics, thermodynamics, transfer and rate mechanisms, electrical theory, the nature and properties of materials, and computer science.

The Engineering Analysis, Design and Systems sequence is directed toward the creative and practical phases of economic design, involving analysis, synthesis, and engineering research and development. This sequence is the most distinctive feature of the engineering curricula, since it is the element of creative and economic design which distinguishes the engineer from the pure scientist.

Engineers and Computer Scientists must develop communication skills through courses in English composition, public speaking, and upper level writing. These skills are reinforced throughout the curricula.

The curriculum in Computer Science consists of general studies, mathematics, science, computer science, and electives.

Entrance Requirements

Prospective students are encouraged to take as many courses as possible in mathematics, science, English, social studies, and foreign languages while in high school. One unit of computer-aided graphics is recommended for engineering students and at least one-half unit of keyboarding and one-half unit of computer programming are recommended.

The level of high school preparation needed to be successful in engineering or computer science degree programs as measured by ACT or SAT scores and high school academic core grade point average has been identified. The following guidelines are established to help high school students understand the level of preparation required for engineering and computer science. These guidelines are established to help MSU students at risk who want to pursue engineering or computer science.

Math Prerequisites

In order to be successful in engineering, a student must develop good math skills through courses in calculus, differential equations, and other math topics. In engineering and computer science, the first math course that applies to a degree is calculus. Taking calculus requires that a student have an adequate preparation in algebra, geometry, and trigonometry.

To provide students with the best possible opportunity for success in calculus, the Department of Mathematics and Statistics has established the following guidelines for placing students in math courses:

- MA 1713 Calculus I - have an ACT math sub-score of 26 or higher, or have grades of C or better in MA 1313 College Algebra and MA 1323 Trigonometry or a C or better in MA 1453 Precalculus with Graphing Calculators.
- MA 1453 Precalculus with Graphing Calculators - have an ACT math sub-score of 24 or higher, or have a grade of C or better in MA 1313 College Algebra
- MA 1313 College Algebra - have an ACT math sub-score of 19 or higher.

Students who are not prepared for Calculus I will be required to first complete Precalculus or a sequence of College Algebra and Trigonometry before taking calculus. This may delay a student from taking some engineering courses until they have developed the proper math background, but this should not discourage a student from pursuing an engineering degree. Improving math skills early in their academic career will result in a student having greater academic success.

Students who do not meet the guidelines for enrolling in Calculus I should consider completing Precalculus or a sequence of College Algebra and Trigonometry during the summer prior to attending Mississippi State. These courses may be taken either at Mississippi State, at a Mississippi Community or Junior College, or at any other accredited two-year or four-year institution. Only grades of C or better will be accepted as satisfying these pre-requisites. Courses taken during high school will not count for this credit unless they were taken as part of a dual enrollment program and appear on a separate transcript from a two-year or four-year institution of higher learning. A combination of College Algebra and Trigonometry may be substituted for Precalculus.

New Freshmen Admission

For regular admission to one of the Bagley College of Engineering’s degree-granting programs as a freshman, students must be admitted to MSU, complete the following high school academic core: 4 units of English, 4 units of mathematics (algebra, geometry, trigonometry), 3 units of science (chemistry and either biology or physics), 3 units of social studies and/or foreign languages and 2 units of electives, and meet any one of the following criteria:

- Have a composite score greater than or equal to 23 on the ACT or 1060 on the SAT
- Have a composite score of 20, 21, or 22 on the ACT or between 940 and 1050 on the SAT with a high school GPA of 3.0 or greater on academic core courses listed above
- Have any ACT or SAT score with a high school GPA of 3.5 or greater on academic core courses listed above.

These criteria are essential for the success of a student beginning an engineering or computer science curriculum at the level shown in the following pages of this Bulletin. Applicants with justifiable circumstances may petition the Dean of Engineering for special admission.

New freshmen applicants who do not meet these requirements, are otherwise admitted to MSU, and want to pursue an engineering degree should join the undeclared major with a pre-engineering concentration. These students will be advised for the first 30 hours by the University Academic Advising Center. Students in the pre-engineering and computer science programs can request to be assigned a mentor from the engineering or computer science faculty.

All students who are classified as Undecided with a Pre-Engineering concentration must enroll in an appropriate math course each semester they are enrolled in this major. Students who fail to meet these requirements will be disenrolled from the Pre-Engineering concentration and remain simply Undecided majors.

Students with course work deficiencies will be required to schedule preparatory course work. This course work will be in addition to that shown in the engineering and computer science curricula and will, in general, extend the time to graduation.

Internal Transfers

Students in the pre-engineering concentration and other students at Mississippi State University may transfer into an engineering degree-granting program if they satisfy any one of the following criteria:

- Meet engineering new freshmen requirements listed above.
- Have completed at least 30 hours with a cumulative GPA greater than or equal to 2.0 and passed Calculus I (MA 1713), English Composition I (EN 1103), and Chemistry I (CH 1213) with grades of C or better.

Internal transfer students should discuss the transfer with the appropriate department head or program coordinator before completing the Change of Major form. Some departments have additional admission requirements for internal transfers.

Students admitted to one engineering or computer science degree program may transfer to another engineering or computer science program at any time so long as they meet departmental transfer requirements.

External Transfers

Students may transfer from other colleges or universities into MSU engineering degree programs if they meet all requirements to transfer to MSU and satisfy any one of the following criteria:

- Meet engineering new freshmen admission standards listed above.
- Have completed at least 30 hours with a cumulative GPA greater than or equal to 2.0 and passed courses equivalent to Calculus I (MA 1713), English Composition I (EN 1103), and Chemistry I (CH 1213) with grades of C or better.

Applicants with justifiable circumstances may petition the Dean of Engineering for special admission.

Coursework taken elsewhere will not be applied toward a degree in the Bagley College of Engineering until it is determined that it is equivalent to required coursework or is an acceptable substitute. Also, only coursework taken elsewhere on which a grade of C or better has been earned will be considered for application toward a degree. No more than one-half of the hours of an engineering or computer science curriculum may be transferred from two-year community or junior colleges.

For admission to undergraduate programs, international students must earn a minimum paper-based TOEFL score of 550 or a computer-based minimum score of 213.

Personal Computer Requirement

All engineering students are required to own or lease a personal laptop computer. Minimum specifications for a computer will be developed and posted on the Bagley College of Engineering home page on the World Wide Web by July of each year. A computer meeting these minimum specifications should suffice for the entirety of a students program of study as long as normal progress is made each semester. Transfer students are required to have a computer that meets the minimum specifications in place at the time their cohorts would have been freshmen. For example, a student transferring as a junior in the Fall of 2017 is required to have a computer that meets the minimum specifications in place for freshmen who entered the Bagley College in the Fall of 2015.

Information on the computer specifications and special pricing which may be available, can be found by visiting the Web site at http://www.bagley.msstate.edu .

Computers are used by students to solve engineering problems, write papers, and develop presentations for classes. Computer technology improves communication between students and faculty and develops the computational skills demanded of engineering graduates by employers. Further, email is an official means of communication with students per university policy.

Students applying for or receiving financial aid should notify the office of Student Financial Aid and Scholarships that they are entering the Bagley College of Engineering and are required to have a personal computer. The cost of the personal computer can then be added to the total cost of education and financial aid may be awarded accordingly. The full cost of the computer will not necessarily be covered by financial aid or scholarships depending on the total amount of aid received and other regulations.

Graduation Requirements

Graduation requirements are the courses and hours shown in the individual programs. Some majors require a grade of C or better in certain courses. This information is available from the department in which the student is enrolled. All students are required to study these requirements together with the course prerequisites, and to be sure that they are taking the proper courses in the curriculum in which they expect to graduate. Students should discuss their programs with their academic advisors each semester, particularly before pre-registration. To graduate with a baccalaureate degree from the Bagley College of Engineering, in addition to meeting the requirements as specified in the Mississippi State University Academic Operating Policy 12.11, candidates must have earned at least a 2.00 cumulative grade point average on all courses scheduled and rescheduled (average on all attempts) at Mississippi State University that are applied toward meeting degree requirements. Departments within the College may have requirements in addition to those specified above. It is the student's responsibility to be sure that requirements are fulfilled in a particular program before applying for a degree.

Credit up to a maximum of six semester hours may be applied toward a baccalaureate degree in the College of Engineering for successful completion of the Army ROTC Advanced Course of study or the Air Force ROTC Professional Officer Course of study. Such credit may not be available to students who, before they enter an ROTC program, have completed those courses for which ROTC credit is usually substituted.

Independent study credit up to a maximum of six semester hours will be accepted, with the prior approval of the department head and the dean. In no case will engineering courses taken by independent study be approved.

No courses taken under the pass/fail option may be used to satisfy degree requirements.

Advanced-Level, Graduate and Certificate Programs

Environmental Engineering

The field of Environmental Engineering is a broad, interdisciplinary area that applies engineering, science and design to improve the quality of the environment, prevent environmental damage, and remediate damage that has occurred. Although a degree in Environmental Engineering is not offered in the Bagley College of Engineering, it is possible to major in Civil Engineering and specify a concentration in Environmental Engineering. More information on this option can be found under the Civil and Environmental Engineering section.

For those not interested in pursuing the environmental engineering concentration but would like to get some knowledge of the area, there are several courses that can be taken in the disciplines of Biological Engineering, Civil and Environmental Engineering, and Chemical Engineering. Courses are offered by these departments that cover many different areas of environmental engineering including: management of natural resources; air pollution control; soil and water quality modeling; drinking water production and distribution; wastewater collection and treatment; food quality assurance; management of agricultural lands and wastes; minimization and management of industrial, municipal, and agricultural wastes; and design sustainability.

Furthermore, students, in consultation with their academic advisors, may take courses to develop an emphasis in environmental engineering. There are related courses taught in the College of Arts and Sciences in environmental chemistry, organic chemistry, biochemistry, microbiology, and geological sciences. Courses related to environmental engineering taught within the Bagley College of Engineering are listed below:

ABE 3513	The Global Positional System and Geographic Information Systems in Agriculture and Engineering	3
ABE 4263	Soil and Water Management	3
ABE 4313	Biological Treatment of Nonpoint Source Pollutants	3
ABE 4803	Biosystems Simulation	3
ABE 4844	Sustainable Communities	4
CHE 4613	Air Pollution Control Design: Theory and Practice	3
CE 2803	Environmental Engineering Issues	3
CE 3501	Water Resource Engineering Lab	1
CE 3503	Water Resource Engineering	3
CE 3801	Environmental Engineering and Water Resources Engineering Lab	1
CE 3823	Environmental Engineering	3
CE 4513	Engineering Hydrology	3
CE 4523	Open Channel Hydraulics	3
CE 4533	Computational Methods in Water Resources Engineering	3
CE 4563	Sedimentation Engineering	3
CE 4583	Stream Reconnaissance	3
CE 4843	Environmental Engineering Chemistry	3
CE 4863	Water and Wastewater Engineering	3
CE 4883	Engineered Environmental Systems	3
CE 4893	Hazardous Waste Management	3

In summary, the Bagley College of Engineering provides several avenues for students to prepare themselves for a career in environmental engineering. While there is no single best avenue for all students, there is a best avenue for a particular student. Working with an academic advisor is the best way to ensure your career goals are met and we recommend they discuss the various options with academic advisors in the college's participating departments.

Graduate Study

The Bagley College of Engineering offers graduate degrees at both the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) levels. Some undergraduate programs also offer a process by which promising undergraduate students may be directly admitted to the Ph.D. program following graduation. Students interested specifically in a graduate program should consult the Graduate Bulletin or contact the department of interest directly.

Master of Science degrees are offered in Aerospace Engineering, Biological Engineering, Biomedical Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Computer Science, Computational Engineering, Electrical Engineering, Industrial Engineering, and Mechanical Engineering. The Master of Science degree requires 24 semester hours of coursework and six semester hours of thesis research. The Master of Science non-thesis option is also offered and requires 33 semesters of coursework. Computer Science also requires two semester hours of seminar for Computer Science. For more information on these programs, interested students should contact the graduate coordinator in the department of interest.

For those students seeking a Master of Science degree in a flexible on-line format, the Bagley College offers an interdisciplinary program consisting of 33 semester hours of coursework. This program culminates in a Master of Engineering degree. More information can be found at www.bcoelearning.msstate.edu or by contacting Ms. Rita Burrell at rburrell@bagley.msstate.edu .

The Doctor of Philosophy degree is available in all engineering departments, either through a composite interdisciplinary program or a specific major. In addition to these, Ph.D. degrees are offered in interdisciplinary programs in Computational Engineering and Applied Physics.

Most teaching departments are able to offer teaching assistantships to qualified graduate students. Additionally, many departments are also able to offer research assistantships. Bagley, Barrier, and Honda graduate Fellowships are also awarded each year. Because Mississippi State University is a member of the National Consortium for Graduate Degrees for Minorities in Engineering and Science, Inc. (GEM), students with GEM Fellowships are eligible to study in the Bagley College.

Students interested in pursuing a graduate education should consult with the graduate coordinators in each academic department, the Associate Dean for Research and Graduate Studies, and The Office of the Graduate School.

Engineering Study Abroad Programs

(See International Study Programs)

MINOR IN GLOBAL ENGINEERING LEADERSHIP

To remain competitive in today's highly competitive global economy and become a leader in companies and organizations that span multiple companies, it is imperative for engineers to have special knowledge and skills. Engineering leaders need to have an understanding of other cultures, the ways of doing business in other countries, and how to effectively collaborate with others across the globe. To be effective, engineering leaders in this global economy must not only have a strong engineering background, but they must also have experience in working across cultures and skills in management and leadership.

The Bagley College of Engineering's minor in Global Engineering Leaderships is designed to provide motivated students with the skills and experiences necessary to put them on the path towards leading engineering activities around the world. Through this program students will develop a proficiency in a foreign language and culture, understanding a different culture through living and studying in a foreign country, and understand leadership and management skills needed in engineering.

The Global Engineering Leadership minor requires to complete 18 hours of coursework from the following areas:

GE 3813	Challenges in Global Engineering	3
Foreign Language		6
Relevant Overseas Engineering Experience [1]		3
Leadership Electives		6
BL 4273	International Business Law	
CE 4703	Construction Engineering and Management	
CE 4743	Analysis and Mitigation of Conflicts, Claims and Disputes	
CE 4903	Civil Engineering Comprehensive	
CSE 3981	Social and Ethical Issues in Computing	
CSE 4223	Managing Software Projects	
GE 2713	Introduction to Engineering and Public Policy	
GE 3011	Engineering Entrepreneurship Seminar	

IB 4103	International Business
EC 4303	International Economic Development
EC 4323	International Economics
IE 3913	Engineering Economy I
IE 4513	Engineering Administration
IE 4533	Project Management
IE 4553	Engineering Law and Ethics
ISE 4103	Cross-Cultural Leadership
MGT 3823	Socially Responsible Leadership
MGT 4613	Cross-Cultural Management
MKT 3323	International Logistics
MKT 4033	International Transportation
MKT 4333	International Supply Chain Management

[1] Examples include: MSU Faculty-led Study Abroad in an engineering course, International Engineering Internship, Semester-long Engineering Exchange Program, or Overseas Service Learning (e.g. Engineers Without Borders)

For more information on the Global Engineering Leadership minor, please contact:

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Box 9544
Mississippi State, MS 39762
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(662) 325-5878

Certificate Programs

Automotive Engineering Certificate

This certificate will enable students enrolled in a variety of engineering degree programs to enhance their education in topical subject matter related specifically to automotive engineering.

The 15 hours of academic credit required for this certificate may be earned by completing selected courses from a list of qualifying designated by a representative faculty committee. These courses include one from the Level I list; two courses from the Level II list; Automotive Engineering (cross-listed as CHE, ECE, IE or ME 4193/ME 6193); plus a directed individual study course related to a team experience in automotive engineering.

Additionally, at least six hours taken for the certificate must be in addition to the courses required for the student's graduation requirements for his or her major. Students should see an advisor for a list of approved courses. In the case of graduate students, the student's graduate committee will determine how many of the courses taken for the certificate fulfill course requirements for the student's degree.

Computational Biology Certificate

The availability of entire genomes of both simple and complex organisms has made advances in the life sciences critically dependent upon computing. The field of computational biology combines computer science and biology to address questions of how biological systems work by analyzing and synthesizing the data made available with high throughput biology. This certificate program will allow undergraduate and graduate students in the computational and life sciences to pursue a well-defined program where they will gain fundamental skills in computing integrated with biology and will become competitive for high-end employment in emerging technical fields. Students will learn how to apply computational techniques to understand structures, functions, dynamics, and evolution of living organisms.

The certificate program is ideal for students working toward or possessing a BS or MS degree in computer science, computer engineering, mathematics, statistics, biological engineering, or one of the life sciences. A Computational Biology certificate will be issued jointly by the Bagley College of Engineering and the College of Agriculture and Life Sciences upon a candidate's successful completion of the requirements of the program.

Certificate Requirements:

CSE 4623/6623	Computational Biology (required of all students)	3
CSE 4613/6613	Bio-computing (required of students in the life sciences)	3
BCH 4113/6113	Essentials of Molecular Genetics (required of students in computer science, computer engineering and biological engineering.)	3

3 additional relevant courses as approved by the Certificate Advisory Board – required of all students	

The Jack Hatcher Engineering Entrepreneurship Program

The role of the engineering entrepreneur in the expansion of the economy is self-evident. Engineers with entrepreneurial spirit and skills are the locomotives of the technology-based startup company and, perhaps more importantly, of the evolution of established industry. Developing entrepreneurial thinking in our graduates is one of the primary learning goals of the Bagley College of Engineering at Mississippi State University. Through an endowment by alumnus Jack Hatcher, we have established a multi-level engineering entrepreneurship program to serve students with different degrees of interest. The primary mission of the program is to expose our students to the broader elements of running a business and the general managerial skills required to prepare them for opportunities in management. For a more limited number, our mission is to equip technologically creative students to recognize opportunities and help instill the confidence to start entrepreneurial businesses.

The basic and broadest element of the entrepreneurship program is a weekly seminar series in which successful entrepreneurs present case histories. Also business leaders discuss specific items, such as patents, hiring employees, and venture capital.

Engineering Entrepreneurship Certificate

For students with higher levels of interest, a formal course of study leading to an Entrepreneurship Certificate is available. The certificate program is a joint program with the College of Business that requires a minimum of 15 semester hours. Students gain knowledge in finance, marketing, and accounting followed by a management course in entrepreneurship where the capstone project is a business plan.

All undergraduate engineering and computer science students in good standing are eligible to join the program. Each student must have a faculty mentor from both engineering and business. To join the program, a student must submit an application that has been signed by both mentors to the Associate Dean of Engineering .

The Entrepreneurship Certificate Program is comprised of three major parts:

1. Completing 15 hours of business and engineering classes:		
ACC 2013	Principles of Financial Accounting	3
EC 2123	Principles of Microeconomics	3
IE 3913	Engineering Economy I	3
MKT 3013	Principles of Marketing	3
MGT 3323	Entrepreneurship	3
2. The Seminars Series		
GE 3011	Engineering Entrepreneurship Seminar	1
3. The “company” or project experience.		

By utilizing electives, students in most engineering disciplines can complete the course requirements with a maximum of six to nine hours of additional work above the degree program. Also, much of the coursework will apply toward the prerequisites for an MBA degree at a later time should the student decide to pursue that path.

A GPA of 2.25 is required on all coursework, and no grade less than a C can be applied toward the certificate. A maximum of two courses can be transfer courses, and correspondence courses will not be accepted. In addition, a passing grade must be obtained for three semesters of GE 3011 Engineering Entrepreneurship Seminar.

The “company” or project experience is the real-world engineering experience of developing a marketable product or service. In most cases, the certificate candidate can get academic credit through the senior design course or a technical elective. For example, Electrical Engineering and Computer Engineering majors can receive credit for the senior design project requirement (ECE 4512/ECE 4522). The “company” experience may be a concept developed by students or faculty members. To complete the requirements for the project experience, the candidate submits a report to the Associate Dean, which has been approved by both mentors. This report usually takes the form of a Business Plan and is developed as part of the entrepreneurship course MGT 3323.

Upon completion of the Entrepreneurship Certificate Program requirements, the Associate Dean will review the student’s records. If all requirements are met satisfactorily, the Associate Dean will submit the candidate to the Deans of Business and of Engineering for issuance of the certificate. The Associate Dean will notify the Registrar to have a statement placed on the candidate’s transcript. The certificate will be issued concurrently with the B.S. Degree in Engineering or Computer Science.

For more information contact:
Mr. Eric Hill
Program Coordinator
Box 5282, Mississippi State University, MS 39762
Phone: (662) 325-3521
email: ehill@oett.msstate.edu

Geospatial and Remote Sensing Engineering Certificate

Geospatial technology refers to the application of technology resources in the acquisition and analysis of data that has a geographic component along with non-spatial attributes associated with the feature(s) under evaluation. Geospatial technologies include remote sensing, geographic information systems (GIS), and global positioning systems (GPS). Over the past several years, MSU has developed a national reputation in research and applications development in geospatial technologies in agriculture, renewable natural resources and transportation. Faculty involved with research utilizing geospatial technologies recently expanded the academic course offerings at MSU in order to extend their experiences to undergraduate and graduate students. With the wide offering of geospatial and related courses in the University curriculum, an engineering certificate program in geospatial technologies, with an emphasis on remote sensing, has been developed.

Eligibility

- Undergraduate students in good standing who are currently enrolled in one of the undergraduate majors in the College of Engineering.
- Current graduate students in good standing in one of the majors in the College of Engineering.
- Other individuals who hold a B.S. degree in a field of engineering from a university accredited by the Engineering Accreditation Commission of ABET.

Applicants will make application for the certificate program to the Director of Education for the High Performance Computing Collaboratory (HPC2). The Director of Education will validate that the applicant meets admission eligibility requirements and forward the application to the Technical Committee of the GeoResources Institute (GRI) for recommendations. Once an applicant is accepted into the certificate program the Director of Education will notify the Dean of Engineering and the Director of GRI.

Issue of Certificates

The Director of Education will validate completion of the requirements for the certificate and will inform the Dean of Engineering when a candidate has successfully completed the curriculum. The Dean of Engineering will issue the certificate and have the appropriate notice placed on the candidate's transcript—"Awarded Geospatial and Remote Sensing Engineering Certificate." The certificate will be signed by the Dean of Engineering, the Director of Education (HPC2) and the Director of GRI.

Curriculum

To receive the certificate, the candidate must complete 15 hours - six hours of core courses, six hours of engineering electives, and three hours of application electives from the lists given below. The curriculum must be completed with a minimum of 2.00 GPA for undergraduate students and a 3.00 GPA for graduate students. No grade less than a C will count toward the certificate. No more than two courses can be transferred from another institution.

Core Courses		
Choose one of the following:		3
ABE /PSS 4483/6483	Introduction to Remote Sensing Technologies	
ECE 4423/6423	Introduction to Remote Sensing Technologies	
ECE 4413/6413	Digital Signal Processing	3
Engineering Electives		
Choose six hours from the following:		6
ABE 3513	The Global Positional System and Geographic Information Systems in Agriculture and Engineering	
ECE 3443	Signals and Systems	
ECE 8401	Current Topics in Remote Sensing	
ECE 8423	Adaptive Signal Processing	
ECE 8433	Statical Signal Processing	
Elective	Engineering Special Topics course - as approved by the GRI Technical Committee and the Dean of Engineering	
Application Electives		
Choose three hours from the following:		3
FO 4313/6313	Spatial Technologies in Natural Resources Management	
GR 2313	Maps and Remote Sensing	
FO 4472/6472	GIS for Natural Resource Management	
FO 4471/6471	GIS for Natural Resource Management Lab	
PSS 4373/6373	Geospatial Agronomic Management	
WFA 4253/6253	Application of Spatial Technologies to Wildlife and Fisheries Management	
Elective	Special Topics in applications areas approved by the Technical Committee of GRI and the Dean of Engineering.	

Information Assurance Certificate

MSU is certified by the National Security Agency as a Center of Academic Excellence in information assurance (IA) education. The IA certificate program is designed for but not limited to, students of the following backgrounds:

- Students participating in the Department of Defense IA Scholarship Program at MSU
- Students participating in the National Science Foundation's Scholarship for Service at MSU
- Government employees interested in IA who desire to take advantage of education support available from their employer
- Government students on campus as part of the National Defense University educational partnership with MSU who are studying IA topics
- MSU students with a desire to focus on IA topics and wish to demonstrate to perspective employers a competency in this area.

Requirements

Admission to the program is managed by the Department of Computer Science and Engineering. All candidates must:

- Be enrolled as a full-or part-time student at MSU
- Demonstrate mastery of computer science, computer engineering, electrical engineering or management information systems fundamentals
- Exhibit knowledge of discrete mathematics, algorithms and data structures at the level of an undergraduate course
- Demonstrate a practical knowledge of computer organization

A minimum of 15 hours must be completed for the Information Assurance certificate.

Required courses		
CSE 4243/6243	Information and Computer Security	3
CSE 4273/6273	Introduction to Computer Forensics	3
CSE 4383/6383	Cryptography and Network Security	3
Choose two of the following:		6
BIS 4513/6513	Microcomputers and Networks	
BIS 4113/6113	Business Information Systems Security Management	
CSE 4153/6153	Data Communications and Computer Networks	
CSE 4733/6733	Operating Systems I	
CSE 4503/6503	Database Management Systems	
MIS students may substitute:		
BIS 3753	Business Database Systems	
BIS 8313	Advanced Database Design Administration	
Any advanced (4000-level or above) IA course approved by the program administrator.		
Total Hours		15

Materials Certificate Program

The Materials Science and Engineering Certificate Program, administered through the Bagley College of Engineering, is available to qualified students who complete an organized plan of study in the interdisciplinary field of Materials Science and Engineering at Mississippi State University.

The University's various departments offer a range of materials-related courses in both the science and engineering fields, such as biomaterials, electronic and semiconductor materials, metals, composites, polymers, ceramics, and construction materials. We also have a wide range of supporting courses in the areas of materials modeling, mechanics, processing, and characterization, along with special topics in tribology, fatigue, fracture, and corrosion. Faculty participating in these course offerings are organized as the Materials Working Group (MWG).

As part of an organized plan of study, including Directed Individual Study courses under the direction of a MWG member, materials-based courses allow students to pursue an interdisciplinary education and training program tailored to individual interests.

The Materials Science and Engineering Certificate Program is available to both traditional and non-traditional students. This allows industry to offer employees further training in materials, as well as provide current university students the opportunity to pursue an interdisciplinary materials specialty.

To apply for this program, the candidate must submit the initial application for the certificate to a MWG Faculty in their home department. The MWG Faculty will validate the proposed courses and forward the package to the MWG Chair. Upon successful completion of the required courses, the MWG will recommend award of the certificate by the Dean of Engineering.

Admission to the Certificate Program:

Students pursuing a materials certificate typically fall into one of the following categories:

1. Persons possessing at least a bachelor's degree in engineering or science; or
2. Persons working towards either a bachelor's or master's degree in engineering or science

Minimum admission requirements:

To be admitted to the program a student must have satisfactorily completed

Chemistry		
CH 1213 & CH 1211	Chemistry I and Investigations in Chemistry I	4
CH 1223 & CH 1221	Chemistry II and Investigations in Chemistry II	4
Calculus		
MA 1713	Calculus I	3
MA 1723	Calculus II	3
Physics		
PH 2213	Physics I	3
PH 2223	Physics II	3

In addition, the student is responsible for meeting all prerequisites for each course taken towards the materials certificate.

Candidates in categories (1) and (2) automatically will meet the program requirements, either upon entrance to the program or in parallel. For those lacking the prerequisites, additional course work must be completed successfully.

In all cases, it is the responsibility of the student to provide an official transcript of all courses taken prior to admission into the program. An application form including a proposed course of study must be completed by the student and an official transcript must be provided for admission to the program. A member of Materials Engineering Working Group will review the application and agree to the program of study.

Certificate Requirements:

To receive a materials certificate, students must complete at least one course from Level I, at least two courses from Level II, at least one course from level III, and a three-hour Directed Individual Study that incorporates a materials-related research project and is under the direction of a MWG faculty member. Students must obtain a grade of "C" or better in each class taken.

Level I: Fundamental materials course. This course may be part of the student's home curriculum. Student must take at least ONE course.		3
ABE 3813	Biophysical Properties of Materials	
CE 3313	Construction Materials	
CHE 3413	Engineering Materials	
ME 3403	Materials for Mechanical Engineering Design	
Level II: Intermediate material courses. These courses extend and enrich the basic materials topics introduced in the Level I courses. Students must take at least TWO courses.		6
CE 4633	Concrete Structures	
CHE 4143/6143	Advanced Polymeric and Multicomponent.	
ECE 4243/6243	Introduction to Physical Electronics	
ECE 3213	Introduction to Solid State Electronics	
EM 4133/6133	Mechanics of Composite Materials	
PH 3613	Modern Physics	
ME 4133/6133	Mechanical Metallurgy	
Elective	Special topics: Courses under development related to basic materials properties such as: Ceramics, Crystallography, Polymers, Composites and Electronic Materials.	
Note: Only one of the two courses in Level II maybe a special topic.		
Level III: Advanced or Applied materials courses. Students must take at least ONE course.		3
ABE 4523/6523	Biomedical Materials	
ABE /CHE /ME 4624/6624	Experimental Methods in Materials Research	
CHE 4423/6423	Fundamentals of Industrial Corrosion	
CHE 4153/6153	Introduction to Particle and Crystallization Technology	
CHE 4163/6163	Nanotechnology in Chemical Applications	
ECE 4283/6283	Microelectronics Device Design	

EPP /ME 8144	Transmission Electro Microscopy
EPP 8223	Scanning Electron Microscopy
ME 4413/6413	Casting and Joining
ME 4123/6123	Failure of Engineering Materials
PH 4813/6813	Introduction to Solid State Physics

For further details about the program and a current listing of allowed courses, please contact the Office of the Dean of Engineering at (662) 325-2270 or visit www.bagley.msstate.edu .

Energy Certificate

The Energy Certificate is designed to permit students in an MSU engineering discipline to designate a five-course sequence leading to a well-defined program in energy. The Energy Certificate utilizes courses in most MSU engineering programs plus a required course in alternate energy sources. Students who successfully complete the Energy Certificate will have acquired significant energy engineering expertise in their and related engineering disciplines, as well as an interdisciplinary overview of energy and sustainable energy concepts.

The Energy Certificate is open to undergraduate students in good standing at MSU. Each student who wishes to participate in the program must provide a letter of intent outlining the proposed course of study to the Chair of the BCoE Energy Working Group.

In order to meet the requirements of the Energy Certificate, a student must complete with a grade of "C" or better at least 15 hours of courses as designated in the Level I, Level II, and Level III categories. Additionally, two of the Level I, II, or III courses must be above the degree requirements of the student.

The list of courses for the Energy Certificate is given below:

Level I		
Thermodynamics		
CHE 3113	Chemical Engineering Thermodynamics I	3
or ME 3513	Thermodynamics I	
or ASE 3333	Aerothermodynamics	
Circuits		
ABE 3413	Bioinstrumentation I	3
or ECE 3183	Electrical Engineering Systems	
or ECE 3413	Introduction to Electronic Circuits	
Level II		
ME 4353	Alternate Energy Sources	3
Level III		
Two senior-level energy courses. See advisor for approved list.		