Oh, the things you will do!

**Cornerstone Design**  
**Capstone Design**  
**National Competitions**  
**Internships**  
**Co-op employment**  
**Undergraduate Research**  
**Study Abroad**  
**Residential Experience**  
**Student Organizations**  
**ACADEMICS**

On behalf of all of our staff, **Welcome Spartan Engineer!**

You are embarking on a major journey in life. After 12 years of taking courses mostly in common with all of the other students your age, **you are now beginning preparation for a profession**, and investing time and resources in a college education directed to your specific goals.

Success in Engineering in the 21st century requires breadth beyond classroom studies and a standard curriculum. To reach your goals, the planning starts now. You need to spend your years as a Spartan Engineer developing the building blocks for a career in engineering or a related field and perhaps additional study in graduate school.

Making your plan starts today at your Academic Orientation Program (AOP) and will continue through your career by interacting with the various units in the office of Engineering Undergraduate Studies (UGS). Our many ways to provide you support and help you broaden your experiences are further described in this handbook. **Keep this book** for your planning and visit our offices to assist you in the many opportunities highlighted above. Our help starts today, in planning your first year of classes.

**You are a Spartan Engineer. Welcome and ... Go Green!**

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**Thomas F. Wolff**, Ph.D., P.E.  
Associate Dean  

**Amanda G. Idema**, Ph.D.  
Assistant to the Dean for Academic Services
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<th>Location</th>
<th>Phone #</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Advising</td>
<td>1410 Engineering Bldg.</td>
<td>355-6616 ext. 1</td>
<td><a href="http://www.egr.msu.edu/undergraduate/advising">www.egr.msu.edu/undergraduate/advising</a></td>
</tr>
<tr>
<td>Admissions</td>
<td>250 Admin Bldg.</td>
<td>355-8332</td>
<td><a href="http://www.admissions.msu.edu">www.admissions.msu.edu</a></td>
</tr>
<tr>
<td>Campus Living Resources</td>
<td>C 101 Wilson Hall</td>
<td>1-877-9LIVEON</td>
<td><a href="http://www.liveon.msu.edu">www.liveon.msu.edu</a></td>
</tr>
<tr>
<td>Chemistry Department</td>
<td>Undergrad Office Chemistry Bldg.</td>
<td>355-9715</td>
<td><a href="http://www.chemistry.msu.edu">www.chemistry.msu.edu</a></td>
</tr>
<tr>
<td>Counseling Center</td>
<td>207 Student Services</td>
<td>355-8270</td>
<td><a href="http://www.counseling.msu.edu">www.counseling.msu.edu</a></td>
</tr>
<tr>
<td>Diversity Programs Office (DPO)</td>
<td>1109 Engineering Bldg.</td>
<td>355-8310</td>
<td><a href="http://www.egr.msu.edu/dpo">www.egr.msu.edu/dpo</a></td>
</tr>
<tr>
<td>Department of Police &amp; Public Safety (DPPS)</td>
<td>87 Red Cedar Rd.</td>
<td>355-2221</td>
<td><a href="http://police.msu.edu">http://police.msu.edu</a></td>
</tr>
<tr>
<td>English Language Center (ELC)</td>
<td>A-714 Wells Hall</td>
<td>353-0800</td>
<td><a href="http://www.elc.msu.edu">www.elc.msu.edu</a></td>
</tr>
<tr>
<td>Financial Aid</td>
<td>252 Student Services</td>
<td>353-5940</td>
<td><a href="http://www.finaid.msu.edu">www.finaid.msu.edu</a></td>
</tr>
<tr>
<td>IAH Department</td>
<td>305 Linton Hall</td>
<td>353-3560</td>
<td><a href="http://www.cisah.msu.edu">www.cisah.msu.edu</a></td>
</tr>
<tr>
<td>ISS Department</td>
<td>302 Berkey Hall</td>
<td>355-9733</td>
<td><a href="http://www.cis-ss.msu.edu">www.cis-ss.msu.edu</a></td>
</tr>
<tr>
<td>Math Department</td>
<td>A-212 Wells Hall</td>
<td>353-0844</td>
<td><a href="http://www.mth.msu.edu">www.mth.msu.edu</a></td>
</tr>
<tr>
<td>Math Learning Center (MLC)</td>
<td>A Wing of Wells Hall</td>
<td>884-1500</td>
<td><a href="http://www.mth.msu.edu">www.mth.msu.edu</a></td>
</tr>
<tr>
<td>Office Intern'l. Stud. &amp; Scholars (OISS)</td>
<td>103 Intern'l. Center</td>
<td>353-1720</td>
<td><a href="http://www.isp.msu.edu/OISS">www.isp.msu.edu/OISS</a></td>
</tr>
<tr>
<td>Physics Department</td>
<td>1312 BPS Building</td>
<td>844-5531</td>
<td><a href="http://www.pa.msu.edu">www.pa.msu.edu</a></td>
</tr>
<tr>
<td>Registrar</td>
<td>150 Admin. Bldg.</td>
<td>355-3300</td>
<td><a href="http://www.reg.msu.edu">www.reg.msu.edu</a></td>
</tr>
<tr>
<td>Study Abroad</td>
<td>109 Intern'l. Center</td>
<td>353-8920</td>
<td><a href="http://studyabroad.msu.edu">studyabroad.msu.edu</a></td>
</tr>
<tr>
<td>The Center (internships, co-ops, career services)</td>
<td>1340 Engineering Bldg.</td>
<td>355-5163</td>
<td><a href="http://www.egr.msu.edu/thecenter">www.egr.msu.edu/thecenter</a></td>
</tr>
<tr>
<td>Undergraduate University Division (UUD)</td>
<td>170 Bessey Hall</td>
<td>355-3515</td>
<td><a href="http://www.msu.edu/dept/uard">www.msu.edu/dept/uard</a></td>
</tr>
<tr>
<td>Women in Engineering (WIE) Program</td>
<td>1340 Engineering Bldg.</td>
<td>355-6616, ext. 3</td>
<td><a href="http://www.egr.msu.edu/wie">www.egr.msu.edu/wie</a></td>
</tr>
<tr>
<td>Writing Center</td>
<td>300 Bessey Hall</td>
<td>432-3610</td>
<td><a href="http://writing.msu.edu">http://writing.msu.edu</a></td>
</tr>
</tbody>
</table>
A Brief History of MSU

In 1855 the Michigan Legislature passed Act 130 which provided for the establishment of the Agricultural College of the State of Michigan and appropriated land and $40,000 to carry the college through its first 2 years of operation. The school was formally opened and dedicated on May 13, 1857, at what is now East Lansing, the site of the present Michigan State University. With the state of Michigan’s Reorganization Act of 1861, the institution changed its name to State Agricultural College, and its first class graduated that same year, many of whom soon after enlisted in the Union Army to fight the Civil War. The College admitted women for the first time in 1870 and the first African-American student was admitted in 1899. In 1909, the institution’s name was changed to Michigan Agricultural College (MAC), a moniker that can still be seen painted on stacks near the current football stadium. Two more name changes occurred—on its centennial anniversary in 1955, the institution was renamed Michigan State University of Agriculture and Applied Science, and in 1964, simply to Michigan State University.

In October of 1936, the College of Engineering attained its first accreditation with the Engineers’ Council for Professional Development (ECPD), now known as ABET, Inc. The Electrical Engineering, Civil Engineering, and Mechanical Engineering programs were accredited that year; Agricultural Engineering (now Biosystems Engineering) followed in 1950, and Chemical Engineering in 1954, the Materials Science and Engineering program was accredited in 1987, and Computer Engineering was accredited in 1999. The College has had eight other accredited programs which have now been discontinued. In 2010, the College has seven ABET accredited degree-granting programs, one which is seeking accreditation for the first time (Computer Science), and another which is on a trajectory to seek accreditation soon, in addition to the non-degree granting Engineering No-Preference major.

In 2010, MSU enrolls over 47,000 students, many of whom reside in the largest single-campus residence hall system in the country with 23 undergraduate halls, one graduate hall, and three apartment villages. There are more than 200 programs of study offered by 17 degree-granting colleges. Approximately 5,000 faculty and 6,400 support staff are employed by the University, which boasts more than 427,000 living alumni worldwide. MSU has more than 180 active linkage agreements with international organizations in more than 50 countries and a sponsored research total of nearly $405 million in 2008-2009. The University is the national leader in study abroad among U.S. public universities (according to the most recent Institute of International Education Open Doors report, which is based on 2007-2008 participation).
2010-2011 Academic Calendar
For a complete listing of important dates, please visit the registrar’s website at https://www.reg.msu.edu/ROInfo/Calendar/Academic20102011.asp

**Fall 2010**

August 29  New Freshmen and Transfer students can move into residence halls

September 1  Classes begin

September 6  Labor Day - University closed

September 8  End of on-line drop/add period, 8PM

September 27  End of tuition refund period

October 20  Middle of the semester, LAST day to drop class with no grade reported, 8PM

November 11  Final date to withdraw from University

November 25-26  Thanksgiving holiday - University closed

December 13-17  Final exams

**Spring 2011**

January 10  Classes begin

January 14  End of on-line drop/add period, 8PM

January 17  Martin Luther King, Jr. Day, no classes, university open

February 3  End of tuition refund period, 8PM

March 2  Middle of semester, LAST day to drop a class with no grade reported, 8PM

March 7-11  Spring break

April 29  Classes end

May 2-6  Final exams
Getting Started
Academic Advising

Who are academic advisors?
Academic advisors are professionals with advanced degrees in counseling, education, university administration and related fields. Academic advisors are here to guide you along the way and provide you with valuable information to help you make good academic decisions, including:

- Choosing a major
- Schedule building
- Required courses and determining course prerequisites
- Test-taking and study skills
- How to get admitted to the college
- Scholarship information
- Campus resources

Advisors in the College of Engineering (Wilson Hall and EB)
- Amanda G. Idema, Ph.D., Assistant to the Dean for Academic Services
- Carmellia Davis-King, M.A.
- Monica Marcelis Fochtman, Ph.D.
- Sean Fochtman, M.A.
- Gaile Griffore, M.A.
- Dan King, M.A.
- Colleen McDonough, M.P.A.
- Teresa VanderSloot, M.A.

Associate Dean’s Office and Support Staff (1410/1415 EB)
- Thomas F. Wolff, Associate Dean
- Support staff

How do I know who my advisor is?
All first year engineering students are advised in Wilson Hall, W-8. The first-year advising team is available every day. Advising in Wilson is done on a walk-in basis, no appointments are necessary.

Once students have achieved sophomore status and declared a major in Engineering, they will be served by academic advisors in their specific engineering discipline. If you are involved in certain programs, such as The Engineering Residential Experience (ERE) or the Honors College, you may have a specific advisor for that program in addition to your College of Engineering advisor.

If you have questions about finding your advisor, stop by the Advising Center, 1410 Engineering Building, or call (517) 355-6616 ext. 1. More information is also available at: www.egr.msu.edu/undergraduate/advising/advisor.
How often should I meet with my advisor?
We suggest that you meet with your advisor regularly, at least once a semester, to receive assistance with major selection, schedule planning, test-taking, study skills, utilizing resources, career planning, and much more. Students should also see their advisor during the annual enrollment period (spring of each year) to plan courses for the next academic year. You should also contact your advisor any time you have an academic question. While some questions can be handled by email, many issues benefit from a two-way conversation.

How should I prepare for my advising appointment?
Before visiting your advisor, you should:

- Reflect on how you are doing in your classes.
- Review the major/degree requirements for the majors that interest you.
- Review course pre-requisites (http://www.reg.msu.edu/Courses/Search.asp) and schedule of courses (http://schedule.msu.edu/).
- Bring a preliminary schedule of courses you intend to take.
- Think about any questions you might have about your major, the College of Engineering, or the University.

Academic programs catalog
Academic Programs is the listing of academic programs, policies and related information. Course Descriptions is the course listing. Together, they comprise the Michigan State University catalog. Updates to Academic Programs occur after approval of the Report of the University Committee on Curriculum (UCC) to Academic Council each September, October, November, January, February, March, and April with the September report always reflecting April actions.

Students should consult with their advisors to learn which specific requirements apply to their degree programs. The academic programs catalog can be viewed online at: http://www.reg.msu.edu/AcademicPrograms/default.asp

Student Handbook
Spartan Life: Student Handbook and Resource Guide, is a helpful resource guide to campus programs and services and also includes rules, regulations, rights and responsibilities that have been established in the interest of intellectual and personal development while protecting individual freedoms.

Part I includes information and services helpful to navigating and taking the best advantage of university opportunities. Part II outlines Students’ Rights and Responsibilities and specifically addresses student conduct, academic pursuits, keeping of records and publications. It describes procedures for formulating regulations governing student conduct and for providing due process in the adjudication of student disciplinary cases. It also defines channels and procedures for student complaints and grievances. Part III provides the General Student Regulations including those for Residence Halls and University Apartments. Student group regulations, administrative rulings, all-university policies and selected ordinances are also included here. Spartan Life is revised and published annually by the Department of Student Life, 101 Student Services Building.
Academic Advising Agreement

As the STUDENT, I agree to:

• Take ownership of my education and be accountable for my decisions
• Learn policies, procedures and requirements – this includes what is required for my university, college, and major requirements and what I need to graduate
• Manage my time and workload appropriately
• Make an appointment to meet with my advisor at least once a semester
• Be on time and prepared for my appointment. If I know I will not make it to my appointment, I will call or email to cancel – I don’t want to be a “no show”
• Read my MSU email often and be professional in communications with advisors, faculty, and other MSU staff

As your ADVISOR, I agree to:

• Help you define your academic and career goals
• Listen carefully to what you are saying
• Help guide you in making life decisions
• Provide you with a safe place for you to share your thoughts, concerns, interests and ambitions
• Provide you with accurate academic and curriculum information (curriculums change often!)
• Teach you how to identify and use campus and Engineering resources
• Be accessible to you during regular business hours through appointments or the phone and respond to your email in a reasonable time

____________________________________________      _____________________
Student Signature      Date
____________________________________________ _____________________
Advisor Signature      Date
Getting Started
University Requirement
Integrative Studies in Social Sciences (ISS)

All Michigan State University students must complete 8 credits (2 courses) of Integrative Studies in Social Sciences (ISS). Students must complete one 200-level course followed by one 300-level course. These courses can be completed at any time during the undergraduate program.

Students are expected to complete 16 credits total across two ISS and two IAH courses. Some courses emphasize national diversity (designated “N”), international and multicultural diversity (designated “I”) or national, international and multicultural diversity (designated “D”). Students must include at least one “N” and one “I” course in the integrative studies programs. A “D” course designation may meet either an “N” or an “I” requirement, but not both. Students may have any combination of the three designations, but not two of the same. For example, two “D” designations will not fulfill the university diversity requirement.

ISS 210     Society & the Individual (D) – 4 credits
Evolution of human behavior with an emphasis on the individual and society. Family and kinship, social organizations. Societal types, personality, and the life cycle.

ISS 215  Social Differentiation & Inequality (D) – 4 credits
Types, causes and consequences of stratification in human societies. Age, class, gender, race and other factors which define social position. Education, occupation, political economy.

ISS 220  Time, Space, & Change in Human Society (D) – 4 credits
Evolutionary, ecological, and spatial theories of adaptation and change. Cultural evolution from prehistoric foraging to the post-industrial age. Continuity and change in the emergence and development of contemporary ways of life.

ISS 225  Power, Authority, & Exchange (D) – 4 credits

ISS 230  Government and the Individual (D) – 4 credits
Critical examination of the role of government in regulating individual behavior. Implications for cultural values and beliefs and modes of behavior. Analysis of consequences of different theories for resolving, or creating problems in public policy.

ISS 235  Liberal Democracy (D) – 4 credits
Cultural tendencies of liberal democracy that form the characters and constitute the ways of life of individuals in liberal democracies.

ISS 300 level courses are taken after the ISS 200 level
ISS 305    Evaluating Evidence: Becoming a Smart Research Consumer (N) – 4 credits
Statistical and methodological principles from the perspective of a critical consumer of social science research results. Recognizing non-empirical assertions, necessary bases for inferring relationships and causal relationships, common threats to research validity, and pertinent biases in human judgment.
ISS 310  People & Environment (I) – 4 credits
Contemporary issues related to the interaction of socio-cultural and ecological systems. Global, regional, national and local environmental problems and responses.

ISS 315  Global Diversity & Interdependence (I) – 4 credits

ISS 318  Lifespan Development Across Cultures (I) – 4 credits

ISS 320  World Urban Systems (I) – 4 credits
Patterns of urbanization in various areas of the world over time. Linkage within and between urban centers. Economic, political and social/behavioral accommodation and adaptation to urban growth and change.

ISS 325  War & Revolution (I) – 4 credits

ISS 327  Risk and Society (D) – 4 credits
Assessment, management, and communication of risk. Role of media in amplifying risk. Topics may include gangs, terrorism, health, stock markets, job markets, sports, food, and traffic. Similarities and differences in understanding risk among scientists and the public, and between natural and social scientists.

ISS 328  The Social Science of Sports (I) – 4 credits
Contemporary issues in sports. Critical examination of the industrial organization, public finance, labor relations, earnings, discrimination, and historical context of sports in society. Analysis of sports gambling, performance enhancement, and strategic decision-making.

ISS 330A  Africa: Social Science Perspectives (I) – 4 credits
Comparative study of geography, cultures, politics, and economies of Africa. Diversity and change.

ISS 330B  Asia: Social Science Perspectives (I) – 4 credits
Comparative study of geography, cultures, politics, and economies of Asia. Diversity and change.

ISS 330C  Latin America: Social Science Perspectives (I) – 4 credits
Comparative study of geography, cultures, politics, and economies of Latin America. Diversity and change.

ISS 335  National Diversity & Change: United States (N) – 4 credits
Racial, ethnic, class, gender, and other forms of diversity in the United States. Systems of dominant-minority relations and forms of prejudice and discrimination. Scope of and responses to group inequalities.

ISS 336  Canada: Social Science Perspectives (I) – 4 credits
Getting Started
University Requirement
Writing, Rhetoric and American Cultures (WRA)

As a Michigan State University student, you will need to complete a 4-credit Tier I writing course in Writing, Rhetoric and American Cultures (WRA), which is usually taken during the freshman year. Students have the option of selecting from a variety of courses, each of which emphasizes unique aspects of American culture. The WRA course requirement must be fulfilled before students are eligible to enroll in the Integrative Studies in Arts and Humanities (IAH) courses.

Students needing additional help in writing (as determined by ACT/SAT scores) will be required to enroll in WRA 1004: Preparation for College Writing and WRA 0102: Preparation for College Writing (lab) before completing the Tier I WRA course.

WRA 110  Writing: Science and Technology – 4 credits
*Drafting, revising, and editing compositions derived from readings on American science and technology to develop skills in narration, persuasion, analysis, and documentation.*

WRA 115  Writing: Law and Justice in the United States – 4 credits
*Drafting, revising, and editing compositions derived from readings on American law and justice to develop skills in narration, persuasion, analysis and documentation.*

WRA 125  Writing: The American Ethnic and Racial Experience – 4 credits
*Drafting, revising, and editing compositions derived from readings on the experience of American ethnic and racial groups to develop skills in narration, persuasion, analysis, and documentation.*

WRA 130  Writing: American Radical Thought – 4 credits
*Drafting, revising, and editing compositions derived from readings on American radical thought to develop skills in narration, persuasion, analysis, and documentation.*

WRA 135  Writing: Public Life in America – 4 credits
*Drafting, revising, and editing compositions derived from readings on American civic tradition and community service-learning experiences to develop skills in narration, persuasion, analysis, and documentation.*

WRA 140  Writing: Women in America – 4 credits
*Drafting, revising, and editing compositions derived from readings on women in America to develop skills in narration, persuasion, analysis, and documentation.*

WRA 145  Writing: Men in America – 4 credits
*Drafting, revising, and editing compositions derived from readings on men in America to develop skills in narration, persuasion, analysis, and documentation.*

WRA 150  Writing: The Evolution of American Thought – 4 credits
*Drafting, revising, and editing compositions derived from American historical, social, and cultural texts to develop skills in narration, persuasion, analysis, and documentation.*
WRA 195H  Writing: Major Topics in American Thought (Honors) – 4 credits

Drafting, revising, and editing compositions derived from readings on major topics in American thought to develop advanced skills in narration, persuasion, analysis, and documentation.

**Note:** Students must complete the Tier I writing requirement with a grade of 2.0 or above before enrolling for IAH courses. Students who earn a grade of less than 2.0 in WRA are required to repeat WRA until a grade of 2.0 is achieved.
Getting Started
University Requirement
Integrative Studies in Arts and Humanities (IAH)

All Michigan State University students must complete 8 credits (2 courses) of Integrative Studies in Arts and Humanities (IAH). Students must first complete the WRA requirements before they can enroll in IAH. After writing, students must enroll in an IAH Choice A course followed by an IAH Choice B course. These courses can be completed at any time during the undergraduate program.

Students are expected to complete 16 credits total across the two ISS and two IAH courses. Some courses emphasize national diversity (designated “N”), international and multicultural diversity (designated “I”) or national, international and multicultural diversity (designated “D”). Students must include at least one “N” and one “I” course in the integrative studies programs. A “D” course designation may meet either an “N” or an “I” requirement, but not both. Students may have any combination of the three designations, but not two of the same. For example, two “D” designations will not fulfill the university diversity requirement.

Choice A courses:
IAH 201 United States & the World (D) – 4 credits
Major issues in development of U.S. society and culture, presented in international and comparative context. Influences from native Americans, Europeans, Africans, and Asians. Organized historically, with thematic emphasis on literature and the arts.

IAH 202 Europe & the World (I) – 4 credits
Cultural encounters and political relationships between Europeans and people(s) from other regions of the world since 1500 as shown through study of written texts, literature, the visual arts, music, and other forms of expression. Examples from Europe and several continents.

IAH 203 Latin America & the World (I) – 4 credits
Major issues in the development of Latin American societies and cultures, presented in global perspective. Influences from indigenous peoples, Europeans, Africans, and others. Organized thematically and historically, through study of written texts, literature, and the arts.

IAH 204 Asia & the World (I) – 4 credits
Major issues in the development of Asian societies and cultures and their interaction with other regions of the world since 1600. Topics from East, Southeast, and South Asia. Organized thematically and historically, through study of written texts, the arts, and other forms of expression.

IAH 205 Africa & the World (I) – 4 credits
Major issues in the development of African societies and their interaction with other regions of the world since 600 through study of written texts, the arts and other forms of expression. Topics from West, East, North, and Southern Africa. Organized thematically and historically.

IAH 206 Self, Society & Technology (D) – 4 credits
Exploration in how technology affects and is affected by our conceptions of ourselves, relations with others, and our ideals. Approaches and materials from philosophy, literature, art, music, and history as well as the natural sciences.
IAH 207   Literature, Cultures, Identities (I) – 4 credits
*Explorations in how literature reflects, creates, and challenges cultural and individual identities. Approaches and materials from literature, philosophy, the arts, religion, and history. Selected themes and issues, variable by term.*

IAH 208   Music & Culture (I) – 4 credits
*Relationships between music and culture. Organized historically, geographically, or thematically, through study of written texts, music, the visual arts, and other forms of expression. Selected topics, variable by term in content and approach.*

IAH 209   Arts, the Visual, & Culture (D) – 4 credits
*Exploration of art and visual culture in historical and cultural contexts. Reading and analysis of images. Approaches and materials from art history, anthropology, history, literature, philosophy, religious studies, economics, and natural science in cross-cultural and international perspective. Content variable by term.*

IAH 210   Middle East & World (I) – 4 credits
*Major issues in the development of Middle Eastern societies and cultures, presented in global perspective. Influences from European, Africans, Asians, and others. Organized thematically and historically, though study of written texts, literature, and the arts.*

**Choice B courses (these are taken after choice A):**

IAH 211A Area Studies & Multicultural Civilizations: Africa (I) – 4 credits
*Arts and humanities of Africa: literature, art, music, religion and philosophy presented in historical context. Selected regions, cultures, and themes. Variable by term.*

IAH 211B Area Studies & Multicultural Civilizations: Asia (I) – 4 credits
*Arts and humanities of Asia: literature, visual arts, music, religion and philosophy presented in historical context. Selected regions, cultures, and themes. Variable by term.*

IAH 211C Area Studies & Multicultural Civilizations: The Americas (D) – 4 credits
*Arts and humanities of the Americas: literature, visual arts, music, religion and philosophy presented in historical context. Selected regions, cultures, and themes. Variable by term.*

IAH 211D Area Studies & Multicultural Civilizations: Middle East (I) – 4 credits
*Arts and humanities of the Middle East: literature, visual arts, music, religion and philosophy presented in historical context. Themes variable by term.*

IAH 221A Great Ages: The Ancient World (I) – 4 credits
*Arts and humanities of the ancient world examined through the frame of urban and intellectual life. Literature, visual arts, music, religion and philosophy presented in historical context. Selected regions and themes. Variable by term.*

IAH 221B Great Ages: The Medieval & Early Modern Worlds (I) – 4 credits
*Arts and humanities of the medieval and early modern worlds: literature, visual arts, music, religion and philosophy presented in historical context. Selected themes. Variable by term.*

IAH 221C Great Ages: The Modern World (I) – 4 credits
*Arts and humanities of the modern world, examined through the frame of urban and intellectual life. Literature, visual arts, music, religion and philosophy presented in historical context. Selected regions and themes. Variable by term.*
IAH 231A  Themes & Issues: Human Values & the Arts and Humanities (D) – 4 credits
Values of individualism, responsibility, love, community, and rationality. Students are introduced to diverse methods and materials from the arts and humanities.

IAH 231B  Themes & Issues: Moral Issues & the Arts and Humanities (D) – 4 credits
Human conflict and moral dilemmas, addressed through diverse methods and materials from the arts and humanities.

IAH 231C  Themes & Issues: Roles of Language in Society (D) – 4 credits
Language as the medium of culture in various societies. Power and social identity as manifested through language. Students are introduced to diverse methods and materials from the arts and humanities.

IAH 241A  Creative Arts & Humanities: Music & Society in the Modern World (D) – 4 credits
The arts and humanities of the modern world through the prism of music. Music traditions and methodologies in their historic context. Relationship of music creativity to societies in which it has been produced.

IAH 241B  Creative Arts & Humanities Philosophy in Literature (D) – 4 credits
Philosophy and literature, relationships to each other and to societies in which they were produced. Themes such as the meaning of life, God and the problem of evil, and the nature of knowledge. Authors such as Voltaire, Dostoevsky, Wright, and Atwood examined from a variety of perspectives.

IAH 241C  Creative Arts & Humanities: Cultural and Artistic Traditions of Europe (I) – 4 credits
European artistic and cultural movements and styles, introduced through works of art, music, literature, philosophy, and religion. Presented in historical context. Specific eras and works variable by term.

IAH 241D  Creative Arts & Humanities: Theater and Society in the West (I) – 4 credits
Artistic creativity seen through the prism of theater, presented in historical context. Influences from art, literature, music, and religion. Focus on translation of social visions into dramatic art. Plays and themes variable by term.

IAH 241E  Creative Arts & Humanities: The Creative Process (D) – 4 credits
Philosophical, religious and historical foundations for understanding the process of creation in visual arts, theatre, music, and literature. Variations across eras and societies.

IAH 241F  Creative Arts & Humanities: Traditions in World Art (I) – 4 credits
Aesthetic qualities of painting, sculpture, and architecture within historical contexts across major civilizations. Visual forms in relation to belief systems and musical and literary traditions.

The course descriptions for ISS, WRA, and IAH are subject to change. For the most current information, students should check the course descriptions website at: http://www.reg.msu.edu/Courses/Search.asp
Getting Started
University Requirement
Bioscience
Engineering students are **not** required to take courses in Integrative Studies in Biological (ISB) and Physical Science (ISP). Instead, this **University** requirement is met by taking **one** of the following bioscience courses:

BS 110  Organisms and Populations – 4 credits  
*Biological diversity and organismal biology. Principles of evolution, population biology, and community structure. This class includes a lab.*

BS 111  Cells and Molecules – 3 credits  
*Macromolecular synthesis; energy metabolism; molecular aspects of development; principles of genetics.*

ENT 205  Pests, Society and Environment – 3 credits  

MMG 201  Fundamentals of Microbiology – 3 credits  
*Microbial structure, function, growth, control, and diversity. Role of microbes in health, industry, and the environment.*

PLB 105  Plant Biology – 3 credits  
*Plant structure, function, development, genetics, diversity and ecology.*

PSL 250  Introductory Physiology – 4 credits  
*Function, regulation and integration of organs and organ systems of higher animals emphasizing human physiology.*

ZOL 141  Introductory Human Genetics – 3 credits  

**Exceptions to the Bioscience Requirement:**

**Applied Engineering Sciences (AES) and Chemical Engineering (ChE)** majors **must** take BS 111 to satisfy both the University requirement and their major bioscience requirement.

**Biosystems Engineering (BE)** majors must take BS 110 to satisfy the University requirement and must also take BS 111 to satisfy a major requirement.

The **Computer Science (CpS)** major also has stipulations regarding the bioscience requirement. Please refer to the Computer Science curriculum guide for this information.

Students who are interested in a **Biomedical Engineering Concentration** should discuss their Bioscience course with their academic advisor.
Getting Started
College of Engineering Requirements

In the first year, engineering students complete two foundation courses which introduce them to the team design process and the analytical tools used in the engineering profession. This is accomplished by taking the following sequence, required for engineering students.

**Introductory Engineering Design and Computing**

**EGR 100** (2cr.) - Introduction to Engineering Design: prerequisite (MTH 116 or concurrently) or (MTH 132 or concurrently)
Team-based, interdisciplinary projects will be used to introduce students to the principles of engineering design processes. Teamwork, career preparation, engineering ethics and other topics will also be discussed.

**EGR 102** (2cr.) - Introduction to Engineering Modeling: prerequisite (EGR 100 or concurrently) and (MTH 132 or concurrently)
Students will learn how to systematically identify and deconstruct engineering problems using tools such as advanced spreadsheets and MATLAB applications. Students will understand various engineering systems, through the use of various mathematical models.

**NOTE:** EGR 102 is required for students in Applied Engineering Sciences, Biosystems Engineering, Civil Engineering, Chemical Engineering, Electrical Engineering, Materials Science, and Mechanical Engineering.

--OR--

**CSE 231** (4 cr.)- Introduction to Programming I: prerequisite (EGR 100 and MTH 132 or concurrently)
CSE 231 is an introduction to programming course. Using the Python language students will learn how to design, implement, and test programs to solve problems such as those in engineering, mathematics and science.

**NOTE:** CSE 231 is required for Computer Science and Computer Engineering majors only.

**Mathematics**

Over the course of your studies, you are expected to display competency in mathematics for introductory calculus through at least differential equations. These mathematics courses are typically done in the first two or two and half years of a student’s academic program. Applied Engineering Sciences (AES) and Computer Science (CpS) students are **not** required to take MTH 235.

**MTH 132** (3 cr.) Calculus I*
**MTH 133** (4 cr.) Calculus II
**MTH 234** (4 cr.) Multivariable Calculus
**MTH 235** (3 cr.) Differential Equations

* MTH 132 – Calculus I is the foundation course for many courses in the engineering program and must be taken early in your academic career. You should not take a break between math courses – keep going until your math sequence is complete.
Placement in mathematics the first-year is determined by the student’s high school math background as evaluated by the MSU Mathematics Placement Test, ACT or SAT Math Score, or Advanced Placement (AP) test. Students who do not place directly into the calculus series must successfully complete one of the sequences below before enrolling in MTH 132:

Sequence A: **MTH 116** (5 cr.) College Algebra & Trigonometry
Sequence B: **MTH 103** (3 cr.) College Algebra
   and **MTH 114** (3 cr.) Trigonometry
Sequence C: **MTH 1825** (3 cr.) Intermediate Algebra
   and **MTH 116** (5cr.) College Algebra & Trigonometry.

**The credits earned in MTH 1825 do not count toward graduation.**

**Chemistry**

All engineering students (except Computer Science majors) are required to complete at least one introductory course in general chemistry, taken during the freshman year. The introductory chemistry requirements for the College of Engineering are:

**CEM 141** (4cr.)- General Chemistry and **CEM 161** (1cr.)- Chemistry lab
Prerequisite: MTH 103 or concurrently; MTH 116 or concurrently
Required for: Applied Engineering Sciences, Biosystems Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, and Mechanical Engineering. Computer Engineering and Electrical Engineering students may choose either Chemistry (CEM 161) or Physics (PHY 191) lab.

-- OR --

**CEM 151** (4cr.)- General and Descriptive Chemistry and **CEM 161** (1cr.)- Chemistry lab
Prerequisite: MTH 116 or concurrently
Required for: Chemical Engineering, Civil Engineering with Environmental Option, and Materials Science and Engineering

**Physics**

All engineering students are expected to develop an understanding of certain fundamental principles of physics as a prerequisite to future engineering coursework. This requirement is met by taking two semesters of calculus-based physics. Check curriculum guides for physics lab requirements.

**PHY 183** (4cr.) – Physics for Scientists and Engineers I
Prerequisite: MTH 132
Online Version: (Summer) PHY 183B (4 cr.)

--AND--

**PHY 184** (4cr.)– Physics for Scientists and Engineers II
Prerequisite: MTH 133; PHY 183 or 193H
Online Version: (Summer) PHY 184B (4 cr.)

**PHY 231** and **PHY 232** do not fulfill the College of Engineering Physics requirements. Please see your academic advisor for more information.
Getting Started  
Biomedical Engineering at Michigan State

What do biomedical engineers do?  
Biomedical engineers develop devices and procedures that solve medical and health-related problems by combining their knowledge of biology and medicine with engineering principles and practices. Biomedical engineers develop new processes, materials, and devices which can be used in the prevention, detection, and treatment of disease, patient rehabilitation, and overall health.

Where is biomedical engineering at MSU?  
Biomedical engineering solutions require knowledge of an underlying engineering discipline. For example, building better knee replacements requires an understanding of mechanical engineering and materials science. At MSU, students choose an engineering major first and then select biomedical electives as part of the major curriculum. Upon completion, biomedical engineering will be listed as a concentration on the student’s transcript. The biomedical engineering concentration may be added to the following engineering disciplines: Biosystems, Chemical, Computer, Electrical, Materials Science, or Mechanical Engineering.

What is the advantage of a concentration?  
Completing a biomedical concentration within your engineering major increases your career options. Employers in the biomedical industry hire engineers for their engineering expertise. With an engineering degree and biomedical concentration, students will be fully qualified in biosystems, chemical, electrical, materials, or mechanical engineering and have expertise in solving biomedical problems. As a result, students can pursue employment in the biomedical field, go on to professional or graduate school, or obtain positions within their engineering discipline.

Students interested in biomedical engineering should speak with their academic advisor early in their careers, as the biomedical concentration has specific bioscience requirements. Examples of some biomedical engineering courses include: biomedical instrumentation, biomedical signal processing, biomaterials, and biofluid mechanics. Students are encouraged to view the curriculum guides at the end of this booklet or on-line for more information.

http://www.egr.msu.edu/undergraduate/academics/programs

Biomedical Concentration with Biosystems Engineering  
Biosystems engineers identify and solve problems at the interface of engineering and biology. In the biomedical area, biosystems engineering students have opportunities for undergraduate research in areas such as microbial modeling and biosensors for rapid detection of pathogens. In this application area, biosystems engineers find employment with pharmaceutical/healthcare companies, medical supply companies, and federal agencies, as well as continuing their studies in medical, veterinary, and graduate school.
Biochemical/Biomedical Concentrations with Chemical Engineering
Historically, chemical engineers have designed devices, pharmaceutical processes, and artificial organs (such as the artificial kidney). Chemical engineers are making significant contributions in computational and functional genomics, biosensors, cell and tissue engineering, biomolecular engineering, gene therapy, metabolic engineering, high-throughput drug screening, and drug formulation and delivery.

Biomedical Concentration with Electrical Engineering
Electrical Engineering students can take courses in the areas of bio-imaging and biomedical applications of signals and systems, and are given opportunities to conduct independent research with faculty in the areas of biomedical engineering. With the departments focus on developing physical systems and data analysis methods for biomedical applications, some of the current research includes: modeling of physiological systems, cardiovascular physiology, biomedical ultrasonics, medical imaging, neural engineering, development of implantable devices and biomedical signal processing.

Biomedical Materials Concentration with Materials Science & Engineering
Biomedical materials engineers create new materials and devices that are used to treat diseases and repair damaged tissues by combining their knowledge and skills in engineering materials design with biology and chemistry. They may conduct research in areas such as tissue engineering (creating new tissues like bone and muscle) and implant development (like total knee and hip replacements), as well as design devices used in various medical procedures (such as screws and plates used in orthopedics). Some will specialize in orthopedics and sports medicine, while others will work in areas such as implant design and manufacturing.

Biomechanical Concentration with Mechanical Engineering
Mechanical engineers combining biomedical engineering are trained in biomechanical engineering and find employment designing, for example, prosthetics, artificial joints, automotive safety equipment, robotics for telemedicine, heart valves, left ventricle assist devices, and the whole range of medical devices. Research by biomechanical engineers includes studying the strength of bones and soft tissues, the motion of cells, the kinematics of human motion, and the flow of blood.
Getting Started
Additional Specializations

Specializations are a linked set of courses administered by several partnering colleges. Completion of a specialization is noted on a student's transcript upon graduation. There are three specializations available to students in the College of Engineering: (1) Environmental Studies, (2) Game Design and Development, and (3) Information Technology.

The specializations in environmental studies and information technology are available to any student in the college. The specialization in game design and development is available to students in the computer science program only.

For more detailed information about specializations, including application procedures, prerequisites, courses, and requirements, students should consult with their academic advisor. Information about specializations can also be found in the academic programs catalog at: http://www.reg.msu.edu/AcademicPrograms/Programs.asp?PType=SPCU
## Getting Started

### List of suggested electives

These courses are good to use if you have room in your schedule for an elective or have limited course options due to your initial Math placement. This is not an exhaustive list, but a list of classes that have a math or science component and are courses which Engineering students have taken in the past. These courses will count towards the total credits needed to graduate, but they will **not** fulfill an Engineering specific requirement.

### Business/Communications

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADV 205</td>
<td>Principles of Advertising</td>
<td>3cr</td>
</tr>
<tr>
<td>COM 100</td>
<td>Human Communications</td>
<td>3cr</td>
</tr>
<tr>
<td>COM 225</td>
<td>Introduction to Interpersonal Communication</td>
<td>3cr</td>
</tr>
<tr>
<td>COM 240</td>
<td>Introduction to Organization Communication</td>
<td>4cr</td>
</tr>
<tr>
<td>TC 100</td>
<td>The Information Society</td>
<td>3cr</td>
</tr>
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</table>

### Computers/Engineering

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<thead>
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<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CSE 100</td>
<td>Computer Science Profession</td>
<td>1cr</td>
</tr>
<tr>
<td>CSE 101</td>
<td>Computing Concepts and Competencies</td>
<td>3cr</td>
</tr>
<tr>
<td>EGR 160</td>
<td>Diversity and Engineering</td>
<td>2cr</td>
</tr>
<tr>
<td>EGR 291</td>
<td>Great Issues in Global Engineering</td>
<td>3cr</td>
</tr>
<tr>
<td>EGR 291</td>
<td>Engineering Success</td>
<td>3cr</td>
</tr>
<tr>
<td>ME 280</td>
<td>Graphic Communications</td>
<td>2cr</td>
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</table>

### Construction/Infrastructure/Materials

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE 150</td>
<td>Metal Fabrication Technology</td>
<td>2cr</td>
</tr>
<tr>
<td>CMP 101</td>
<td>Principles of Building Construction Mgmt</td>
<td>2cr</td>
</tr>
<tr>
<td>HRT 111</td>
<td>Landscape Design</td>
<td>3cr</td>
</tr>
<tr>
<td>IDES 240</td>
<td>Computer-Aided Design for Designers</td>
<td>3cr</td>
</tr>
<tr>
<td>LA 200</td>
<td>Introduction to Landscape Architecture</td>
<td>3cr</td>
</tr>
<tr>
<td>PKG 101</td>
<td>Principles of Packaging</td>
<td>3cr</td>
</tr>
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</table>

### Economics/Finance

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC 201</td>
<td>Introduction to Microeconomics</td>
<td>3cr</td>
</tr>
<tr>
<td>EC 202</td>
<td>Introduction to Macroeconomics</td>
<td>3cr</td>
</tr>
<tr>
<td>EC 210</td>
<td>Economics Principles Using Calculus</td>
<td>3cr</td>
</tr>
<tr>
<td>FCE 238</td>
<td>Personal Finance</td>
<td>3cr</td>
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</table>

### Environment

<table>
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<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>AST 101</td>
<td>The Celestial Clockworks</td>
<td>1cr</td>
</tr>
<tr>
<td>HRT 111</td>
<td>Landscape Design</td>
<td>3cr</td>
</tr>
<tr>
<td>GLG 201</td>
<td>The Dynamic Earth</td>
<td>4cr</td>
</tr>
<tr>
<td>LA 200</td>
<td>Introduction to Landscape Architecture</td>
<td>3cr</td>
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### Other

<table>
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<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CJ 110</td>
<td>Introduction to Criminal Justice</td>
<td>3cr</td>
</tr>
<tr>
<td>EAD 315</td>
<td>Student Leadership Training</td>
<td>3cr</td>
</tr>
<tr>
<td>ISP 205</td>
<td>Visions of the Universe</td>
<td>3cr</td>
</tr>
<tr>
<td>ISP 215</td>
<td>The Science of Sound</td>
<td>3cr</td>
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</table>
List of suggested electives, cont’d.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ISP 217</td>
<td>Water and the Environment</td>
<td>3 cr</td>
</tr>
<tr>
<td>KIN 121</td>
<td>The Healthy Lifestyle</td>
<td>3 cr</td>
</tr>
<tr>
<td>KIN 125</td>
<td>First Aid and Personal Safety</td>
<td>3 cr</td>
</tr>
<tr>
<td>MUS 175</td>
<td>Understanding Music</td>
<td>2 cr</td>
</tr>
<tr>
<td>MUS 178</td>
<td>Music Theory for Non Music Majors I</td>
<td>2 cr</td>
</tr>
<tr>
<td>SOC 100</td>
<td>Introduction to Sociology</td>
<td>4 cr</td>
</tr>
<tr>
<td>SOC 215</td>
<td>Race and Ethnicity</td>
<td>3 cr</td>
</tr>
<tr>
<td>TE 250</td>
<td>Human Div. Power &amp; Opp. In Soc. Inst.</td>
<td>3 cr</td>
</tr>
<tr>
<td>UGS 101</td>
<td>Freshman Seminar</td>
<td>1 cr</td>
</tr>
<tr>
<td>WS 201</td>
<td>Introduction to Women’s Studies</td>
<td>4 cr</td>
</tr>
</tbody>
</table>
Getting Started
Schedule Planning Worksheet

At MSU, students enroll for an academic year. Therefore, every spring, you will need to plan courses for the following fall and spring semesters. In each semester, you should have at least 12 credits, which is full-time status.

Starting in **MTH 1825**, a first year Engineering schedule, might look like this:

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
<th>Summer</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRA 1**</td>
<td>4</td>
<td>CEM 141</td>
<td>4</td>
<td>MTH 132</td>
<td>4</td>
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<tr>
<td>ISS 2**</td>
<td>4</td>
<td>CEM 161</td>
<td>1</td>
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<tr>
<td>MTH 1825</td>
<td>3</td>
<td>MTH 116</td>
<td>5</td>
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<tr>
<td>Bioscience</td>
<td>3-4</td>
<td>IAH 20*</td>
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<td><strong>Total</strong></td>
<td>14-15</td>
<td><strong>Total</strong></td>
<td>14</td>
<td><strong>Total</strong></td>
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A second year Engineering schedule might look like this:

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
<th>Summer</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MTH 133</td>
<td>4</td>
<td>MTH 234</td>
<td>4</td>
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<tr>
<td>PHY 183</td>
<td>4</td>
<td>PHY 184</td>
<td>4</td>
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<tr>
<td>EGR 100</td>
<td>2</td>
<td>ISS 3**</td>
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<tr>
<td>Major course</td>
<td>3-4</td>
<td>EGR 102</td>
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<tr>
<td><strong>Total</strong></td>
<td>13-14</td>
<td><strong>Total</strong></td>
<td>14</td>
<td><strong>Total</strong></td>
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</tr>
</tbody>
</table>

After reading the university and College of Engineering requirements on the previous pages, use the guide to plan **your** preliminary schedule:

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
<th>Summer</th>
<th>Credits</th>
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</tbody>
</table>
Getting Started
Schedule Planning Worksheet

At MSU, students enroll for an academic year. Therefore, every spring, you will need to plan courses for the following fall and spring semesters. In each semester, you should have at least 12 credits, which is full-time status.

Starting in **MTH 103**, a *first year* Engineering schedule might look like this:

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<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
<th>Summer</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRA 1**</td>
<td>4</td>
<td>ISS 2**</td>
<td>4</td>
<td>MTH 132</td>
<td>4</td>
</tr>
<tr>
<td>MTH 103</td>
<td>3</td>
<td>MTH 114</td>
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</tr>
<tr>
<td>CEM 141</td>
<td>4</td>
<td>IAH 20*</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEM 161</td>
<td>1</td>
<td>EGR 100 or Elective</td>
<td>2-3</td>
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<td></td>
</tr>
<tr>
<td>Bioscience</td>
<td>3-4</td>
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<td><strong>Total</strong></td>
<td><strong>15-16</strong></td>
<td><strong>Total</strong></td>
<td><strong>13-14</strong></td>
<td><strong>Total</strong></td>
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</table>

A *second year* Engineering schedule might look like this:

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
<th>Summer</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTH 133</td>
<td>4</td>
<td>MTH 234</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHY 183</td>
<td>4</td>
<td>PHY 184</td>
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</tr>
<tr>
<td>EGR 102</td>
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<td>ISS 3**</td>
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<tr>
<td>Major course</td>
<td>3-4</td>
<td>Major course</td>
<td>3-4</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>13-14</strong></td>
<td><strong>Total</strong></td>
<td><strong>15-16</strong></td>
<td><strong>Total</strong></td>
<td></td>
</tr>
</tbody>
</table>

After reading the university and College of Engineering requirements on the previous pages, use the guide to plan **your** preliminary schedule:

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
<th>Summer</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td><strong>Total</strong></td>
<td><strong>Total</strong></td>
<td><strong>Total</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Getting Started

### Schedule Planning Worksheet

At MSU, students enroll for an academic year. Therefore, every spring, you will need to plan courses for the following fall and spring semesters. In each semester, you should have at least 12 credits, which is full-time status.

**Starting in MTH 116, a first year Engineering schedule, might look like this:**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
<th>Summer</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISS 2**</td>
<td>4</td>
<td>EGR 100</td>
<td>2</td>
<td>MTH 133</td>
<td>4</td>
</tr>
<tr>
<td>CEM 141</td>
<td>4</td>
<td>MTH 132</td>
<td>3</td>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>CEM 161</td>
<td>1</td>
<td>Bioscience</td>
<td>3-4</td>
<td>PHY 183</td>
<td>4</td>
</tr>
<tr>
<td>MTH 116</td>
<td>5</td>
<td>WRA 1**</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Elective</td>
<td>1-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>14</td>
<td><strong>Total</strong></td>
<td>13/16</td>
<td><strong>Total</strong></td>
<td>4/8</td>
</tr>
</tbody>
</table>

**A second year Engineering schedule might look like this:**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
<th>Summer</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTH 234</td>
<td>4</td>
<td>MTH 235</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHY 183</td>
<td>4</td>
<td>PHY 184</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IAH 20*</td>
<td>4</td>
<td>ISS 3**</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major course</td>
<td>3-4</td>
<td>Major course</td>
<td>3-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15-16</td>
<td><strong>Total</strong></td>
<td>14-15</td>
<td><strong>Total</strong></td>
<td></td>
</tr>
</tbody>
</table>

**After reading the university and College of Engineering requirements on the previous pages, use the guide to plan **your** preliminary schedule:**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
<th>Summer</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>Total</strong></td>
<td></td>
</tr>
</tbody>
</table>
Getting Started
Schedule Planning Worksheet

At MSU, students enroll for an academic year. Therefore, every spring, you will need to plan courses for the following fall and spring semesters. In each semester, you should have at least 12 credits, which is full-time status.

Starting in **MTH 132**, a **first year** Engineering schedule might look like this:

<table>
<thead>
<tr>
<th>Fall Credits</th>
<th>Spring Credits</th>
<th>Summer Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 100 2</td>
<td>EGR 102 2</td>
<td></td>
</tr>
<tr>
<td>CEM 141 4</td>
<td>MTH 133 4</td>
<td></td>
</tr>
<tr>
<td>CEM 161 1</td>
<td>PHY 183 4</td>
<td></td>
</tr>
<tr>
<td>MTH 132* 3</td>
<td>WRA 1** 4</td>
<td></td>
</tr>
<tr>
<td>ISS 2** 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total 14</strong></td>
<td><strong>Total 14</strong></td>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

A **second year** Engineering schedule might look like this:

<table>
<thead>
<tr>
<th>Fall Credits</th>
<th>Spring Credits</th>
<th>Summer Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTH 234 4</td>
<td>MTH 235 3</td>
<td></td>
</tr>
<tr>
<td>PHY 184 4</td>
<td>Bioscience 3-4</td>
<td></td>
</tr>
<tr>
<td>IAH 20* 4</td>
<td>ISS 3** 4</td>
<td></td>
</tr>
<tr>
<td>Major course 3-4</td>
<td>Major course 3-4</td>
<td></td>
</tr>
<tr>
<td><strong>Total 15-16</strong></td>
<td><strong>Total 13-15</strong></td>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

After reading the university and College of Engineering requirements on the previous pages and the curriculum guides in the back of this booklet, use the guide to plan **YOUR** preliminary schedule in the space below:

<table>
<thead>
<tr>
<th>Fall Credits</th>
<th>Spring Credits</th>
<th>Summer Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>Total</strong></td>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>
Getting Through Admission to the College of Engineering

Students are admitted to the College of Engineering as soon as they have completed the six required core courses and have met specific GPA requirements for their declared major. Students must be admitted to the college to enroll for 300 and 400 level courses. Eligible students are automatically reviewed every semester and admitted once they have:

- completed the required courses
- declared a degree granting Engineering major (No-Preference is not a degree granting major)
- attained a specific combination grade point average (explained on the next two pages)
- attained a minimum of 2.00 grade-point average in all mathematics courses (above remedial) taken at MSU.

University policy states that students must be admitted to a degree-granting major by the time they have attained 56 credits.

Courses Required for Admission to the College of Engineering

- MTH 132 – Calculus I
- MTH 133 – Calculus II
  - (Students must have a minimum 2.0 grade point average or higher in all mathematics courses completed at the time of admission. This does not include MTH 1825.)
- CEM 141- General Chemistry or CEM 151 General and Descriptive Chemistry for all majors except Computer Science
- PHY 183 or 183B – Physics for Scientists and Engineers I
- EGR 100- Introduction to Engineering Design
- EGR 102- Introduction to Engineering Modeling OR CSE 231- Introduction to Programming I, (for Computer Engineering and Computer Science majors only.)

Admission to the College of Engineering is based in part on a student’s combined (combo) grade point average. Please see instructions on the next page on how to calculate your combined grade point average.

An admitted student who wishes to change to a different engineering major must submit an application that will be reviewed at the end of the semester in which the application was submitted. Please see our website for more information: www.egr.msu.edu/undergraduate/admission/admit.

In some cases, an application to the College may be necessary. Juniors and seniors who have a declared major outside the College of Engineering and wish to change to Engineering should submit an application directly to an Engineering major/department, which can be found at: www.egr.msu.edu/undergraduate/admission/admit.
Getting Through
Calculating Your Grade Point Averages (GPA)

As an Engineering student, you will have three GPAs: cumulative, technical, and combination. Each of these GPAs is explained below.

**Your Cumulative GPA** is an average of the grades you received for all courses you have taken for credit at MSU. Your cumulative GPA can be found in STUINFO (Click on “Credits and GPA”). First, multiply the credits for each MSU course you have taken by grade you received to get your points. Then, divide your total points by your total credits to get your cumulative GPA. Example:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Multiply</th>
<th>Grade Rec’d.</th>
<th>Equals</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENT 205</td>
<td>3</td>
<td>x</td>
<td>2.5</td>
<td>=</td>
<td>7.5</td>
</tr>
<tr>
<td>CEM 141</td>
<td>4</td>
<td>x</td>
<td>3.0</td>
<td>=</td>
<td>12.0</td>
</tr>
<tr>
<td>CEM 161</td>
<td>1</td>
<td>x</td>
<td>4.0</td>
<td>=</td>
<td>4.0</td>
</tr>
<tr>
<td>ISS 215</td>
<td>4</td>
<td>x</td>
<td>2.5</td>
<td>=</td>
<td>10.0</td>
</tr>
<tr>
<td>MTH 132</td>
<td>3</td>
<td>x</td>
<td>3.0</td>
<td>=</td>
<td>9.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>42.5</strong></td>
</tr>
</tbody>
</table>

42.5 (total points) ÷ 15 (total credits) = 2.8333 Cum GPA

**Your Technical GPA** is an average of the grades you have received for all technical courses taken in the College of Engineering, Natural Science, or Veterinary Medicine. An official list of technical courses can be found at [http://www.egr.msu.edu/files_egr/TechGPACrses.pdf](http://www.egr.msu.edu/files_egr/TechGPACrses.pdf)

The calculation is the same as the Cumulative GPA, except that it only includes your science and engineering related courses. Students should note that technical courses are counted twice, once in the cumulative GPA and then again in the technical GPA. If you have repeated a course, only the most recent grade should be used. In this example, notice that ISS 215 from the list above is not included because it is not technical:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Multiply</th>
<th>Grade Rec’d.</th>
<th>Equals</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENT 205</td>
<td>3</td>
<td>x</td>
<td>2.5</td>
<td>=</td>
<td>7.5</td>
</tr>
<tr>
<td>CEM 141</td>
<td>4</td>
<td>x</td>
<td>3.0</td>
<td>=</td>
<td>12.0</td>
</tr>
<tr>
<td>CEM 161</td>
<td>1</td>
<td>x</td>
<td>4.0</td>
<td>=</td>
<td>4.0</td>
</tr>
<tr>
<td>MTH 132</td>
<td>3</td>
<td>x</td>
<td>3.0</td>
<td>=</td>
<td>9.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>11</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>32.5</strong></td>
</tr>
</tbody>
</table>

32.5 (total points) ÷ 11 (total credits) = 2.9545 technical GPA
Admission to the College of Engineering is based on your Combined (“Combo”) GPA. Your combination grade point average is the average of your cumulative GPA and your technical GPA. The combo GPA is calculated as follows:

1) the **cumulative** grade point average of *all* courses taken **added to**

2) the **technical** grade point average based on all technical classes taken at MSU (generally those in the College of Engineering and the College of Natural Science), then **divided by 2**.

The formula for calculating your combined GPA is:

\[
\frac{{(\text{Cumulative GPA}) + (\text{Technical GPA})}}{2} = \text{Combined (“Combo”) GPA}
\]

**Finally, the Combo GPA** for the courses listed on the previous page would be calculated like this:

\[
\frac{{(2.8333) + (2.9545)}}{2} = 2.8939
\]

For more information about the combined grade point average required for admission, refer to the website:  
[www.egr.msu.edu/undergraduate/admission/admit](http://www.egr.msu.edu/undergraduate/admission/admit)
In the blank box below, calculate your cumulative GPA

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Multiply</th>
<th>Grade Rec’d.</th>
<th>Equals</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td></td>
<td></td>
<td>=</td>
<td></td>
<td></td>
</tr>
<tr>
<td>x</td>
<td></td>
<td></td>
<td>=</td>
<td></td>
<td></td>
</tr>
<tr>
<td>x</td>
<td></td>
<td></td>
<td>=</td>
<td></td>
<td></td>
</tr>
<tr>
<td>x</td>
<td></td>
<td></td>
<td>=</td>
<td></td>
<td></td>
</tr>
<tr>
<td>x</td>
<td></td>
<td></td>
<td>=</td>
<td></td>
<td></td>
</tr>
<tr>
<td>x</td>
<td></td>
<td></td>
<td>=</td>
<td></td>
<td></td>
</tr>
<tr>
<td>x</td>
<td></td>
<td></td>
<td>=</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total

__________ (total points) ÷ __________ (total credits) = __________ Cum GPA

In the blank box below, calculate your technical GPA

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Multiply</th>
<th>Grade Rec’d.</th>
<th>Equals</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td></td>
<td></td>
<td>=</td>
<td></td>
<td></td>
</tr>
<tr>
<td>x</td>
<td></td>
<td></td>
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<td>x</td>
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<td>x</td>
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</tr>
<tr>
<td>x</td>
<td></td>
<td></td>
<td>=</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total

__________ (total points) ÷ _________ (total credits) = ________ Technical GPA

Calculate your Combo GPA

\[
\frac{[\text{_________ (cum GPA)} + \text{_________ (technical GPA)}]}{2} = \text{_______ Combo GPA}
\]
Getting Connected…to Resources

Academic Assistance
As a first-year student, you are beginning the transition from high school to the rigors of the college curriculum. As a college student, you will be trained and challenged to think in new and exciting ways. There are many engineering and university resources available (free of cost!) to help you with the transition to an advanced and scholarly way of thinking and writing. Those resources include:

- Chemistry Help Room
- ERE tutors and peer leaders
- Guided Learning Center (GLC)
- Peer Assisted Learning (PAL)
- Math Learning Center
- Writing Center

The key to academic success in college is to develop good time management skills early in the semester and to designate time to your studies every day. It is okay to ask for help. See your advisor for more information. We are here to help you succeed!

The Center/Spartan Engineering
Experiential Engineering Education is a broad term used to describe co-curricular programs that enhance the classroom educational experience. These opportunities may include traditional cooperative (co-op) education and internship programs, on-campus research or intern positions, study abroad opportunities, service-learning, and other non-traditional approaches to learning.

If you are ready to start exploring experiential education opportunities, or just want to see what positions might be available, sign up on MySpartanCareer.com to access Experiential Education’s online application and job postings. Depending on the opportunity, you can begin working your freshman year.

For more information, please visit our website: www.egr.msu.edu/careers, stop by 1340 Engineering Building, or call us at (517) 355-5163.

The Center Staff – Garth Motschenbacher, Director of Employer Relations
Bernadette Friedrich, Director of Student Advancement
Jennifer Jennings, Field Career Consultant
Tiffany Norwood, Office Assistant

Diversity Programs Office (DPO) and Guided Learning Center (GLC)
The DPO is proud to support and provide resources for all students, with a particular emphasis on assisting groups underrepresented in Engineering. The DPO offers the following services, free of charge!

- The Guided Learning Center offers academic assistance in any course through drop-in and one-on-one tutoring sessions
- Professional development
- Resource materials
- Speakers, trips, events, and programs
- Opportunities for students to network with faculty, staff, and career professionals
• A freshman/sophomore course, *Diversity and Engineering*, (EGR 160)
  o Business protocol, resume writing, interviewing, and study skills.
  o Practicing engineers come to class and discuss professional development.

These services are made possible through cooperation with other Engineering and MSU departments, the volunteerism of our alumni and friends, and generous grants and gifts resulting from partnerships with numerous corporations and non-profit organizations.

For more information, please visit our website at [www.egr.msu.edu/dpo](http://www.egr.msu.edu/dpo) or call us at (517) 355-8310.

  The DPO Staff – Theo Caldwell, Director
  Kyle Foster, Assistant Director
  Lisa Henry, Secretary
  Rickey Caldwell, Guided Learning Center Coordinator
  Tonisha Lane, Academic Coordinator

**Engineering Residential Experience (ERE)**
The Engineering Residential Experience (ERE) is a unique living and learning opportunity for Spartan Engineers. This program will help Spartan Engineers be successful in their transition from high school to the rigors of higher education and the Engineering curriculum. Students who participate will be presented with opportunities to learn about innovative engineering technology and research, the engineering profession, and careers. All first-year Engineering students are invited to participate in the various aspects of the engineering residential experience which include: tutoring, themed presentations and speakers, and student success seminars.

  The ERE Staff - Neeraj Buch, Ph.D., Director of Residential & Cornerstone Prog.
  Carmellia Davis-King, M.A., Co-Curricular Director
  Timothy Hinds, M.S., Cornerstone Director and Instructor

**Engineering Study Abroad**
At MSU, we take pride in being a leader in study abroad. In the College of Engineering, we strive to help our students prepare to compete in this growing global climate. One of the many ways to do this is to study abroad during the course of your studies here at State. Study abroad options include year-long, semester, and summer stay options.

We recommend that students who plan to go abroad begin the planning process with their advisor early on in their academic careers. Students who intend to go abroad should also reserve at least one of their IAH or ISS requirements for use while abroad.

We are waiting to assist you in choosing a study abroad experience that is right for you. Come to the Engineering Study Abroad Office at 1108D EB to begin planning this important part of your college experience! Engineering Study Abroad has programs in:
- Australia
- France
- Germany
• Italy
• Mexico
• Sweden
• Taiwan
• United Kingdom
• And more!

Aside from Engineering-specific programs, you can also choose from other MSU sponsored programs. The University Study Abroad Office is located in 109 International Center, (517) 353-8920.

For more information on Engineering-specific programs, please visit our website at [www.egr.msu.edu/study-abroad](http://www.egr.msu.edu/study-abroad), stop by 1108 Engineering Building, or call us at (517) 355-8310.

The Study Abroad Staff – Maggie Blair-Ramsey, Study Abroad Coordinator

Scholarship Information
The College of Engineering administers a variety of scholarships from corporate and private donors in addition to the various financial aid programs available through the Office of Financial Aid. These engineering awards are generally based on academic excellence and are available for returning students. Scholarship applications will be available after January 1st of each year and are due in February. For further information visit: [www.egr.msu.edu/undergraduate/resources/scholarships](http://www.egr.msu.edu/undergraduate/resources/scholarships).

Women in Engineering Program (WIE)
The Women in Engineering Program (WIE) encourages students of all backgrounds to pursue careers in Engineering. While our particular emphasis is assisting women students, we collaborate with others in the College and University to provide an environment that is conducive to all students' success, providing opportunities for academic, personal and professional growth. WIE programs include mentoring opportunities, outreach programs, connection to important resources, and a class on success in engineering. WIE also supports the Society of Women Engineers and MSU Women in Computing, two very active student organizations in the College of Engineering. For more information about WIE, visit our website at: [www.egr.msu.edu/wie](http://www.egr.msu.edu/wie), stop by the office in 1340 Engineering Building, or call at (517) 355-6616, ext.3.

The WIE staff- Judy Cordes, M.A., Coordinator of the WIE program

You can find the various Undergraduate Studies (UGS) Resources on:
Getting Connected…to peers and friends
Engineering Student Groups and Organizations

Involvement in co-curricular experiences and leadership training and development will play an important role in your college experience. Student clubs and organizations provide students with the opportunity to meet other students in their major, and to connect with faculty and company representatives. Participation in student organizations can help you connect with new people and develop leadership skills. Research has also shown that involvement in student organizations increases students’ grade point averages and their satisfaction with and persistence in college. Get involved! Below is a list of the engineering student groups and organizations available in the College:

Amateur Radio Club (W8SH)

American Institute of Chemical Engineers (AIChE) – www.egr.msu.edu/aiche

American Society of Agricultural and Biological Engineers (ASABE)- www.egr.msu.edu/beclub

American Society of Civil Engineers (ASCE) – www.egr.msu.edu/asce

American Society for Engineering Education (ASEE) – www.asee.org

American Society of Mechanical Engineers (ASME) – www.egr.msu.edu/asme

Association for Computing Machinery (ACM) – www.acm.cse.msu.edu

Baja SAE – www.egr.msu.edu/baja

Biomedical Engineering Society (BMES) – www.egr.msu.edu/bmes

Chi Epsilon (Civil Engineering Honor Society)- www.chi-epsilon.org/

Engineers Without Borders (EWB) – www.msu.edu/~ewb

Environmental Engineering Student Society (EESS) – www.egr.msu.edu/eess

Eta Kappa Nu (HKN) – www.egr.msu.edu/hkn

Formula SAE – www.egr.msu.edu/fsae

Institute of Electrical and Electronics Engineers (IEEE) MSU Student Branch – www.egr.msu.edu/ieee

International Society of Pharmaceutical Engineering (ISPE) – www.egr.msu.edu/ispe
Leadership Advantage- [website](http://www.egr.msu.edu/la)

Materials Science Society (MSE Society) – [website](http://www.egr.msu.edu/msesoc)
National Society of Black Engineers (NSBE) – [website](http://www.egr.msu.edu/nsbe)

National Society of Professional Engineers (NSPE) – [website](http://www.egr.msu.edu/nspe)

Omega Chi Epsilon – [website](http://www.egr.msu.edu/oxe)

Pi Tau Sigma – [website](http://www.egr.msu.edu/pts)

Society of Applied Engineering Sciences (SAES) – [website](http://www.egr.msu.edu/saes)

Society of Hispanic Professional Engineers (SHPE) – [website](http://www.egr.msu.edu/shpe)

Society of Women Engineers (SWE) – [website](http://www.egr.msu.edu/swe)

Solar Car Team – [website](http://www.egr.msu.edu/solar)

Student Engineering Council (SEC) – [website](http://www.egr.msu.edu/sec)

Tau Beta Pi MSU Chapter

Triangle Fraternity MSU Chapter – [website](http://www.egr.msu.edu/triangle)

Upsilon Pi Epsilon – [website](http://www.cse.msu.edu/~upe)

Women in Computing - [website](http://www.egr.msu.edu/msuwic)

For more information on Engineering Student Groups and Organizations, check out the College of Engineering Student Groups and Organizations website: [website](http://www.egr.msu.edu/egr/services/student/studentgroups.php).
Getting Connected…to the Profession
Who are Engineers and what do they do?

Jennifer has been thinking about her career for some time and feels certain she wants to be a materials engineer and work in biomedical applications. Jason doesn’t know much about engineering, but was told “you are very good in math and science, you should be an engineer!” So here he is. Perhaps this sounds like you, too.

But wait! What is an engineer, really, and what do they do? Do I really know what kind I want to be? Am I sure?

The resources of the Undergraduate Studies (UGS) Office and its units are here to help Jennifer, Jason, and you. Here are some things to know about engineers and what they do out in the “real world.”

- Traditionally, engineers apply the principles of math and science to design processes and products that improve the quality of life.
- Almost everything you see and touch has had the involvement of an engineer – the chair you are sitting on, the fabric in your clothes, the road you came here on, the car you rode in, your cell phone, the processes to make your medication.
- More and more employers are hiring engineering graduates across all majors in search of students with good technical skills and problem-solving skills to manage complex operations. These include major retail firms, railroads, insurance companies and others.
- Finally, an engineering degree can be an excellent path toward advanced professional degrees in medicine, law, or business.

As an engineer “in the field,” you will be a professional

- A professional is expected to have advanced knowledge in a specific area, well beyond that of the common person, including those educated in other fields. This is why you need depth of study in your chosen major.
- A professional may be expected to apply that knowledge to a broad range of situations. In these situations, the solutions cannot simply be tabulated in a list, book or manual; you will need to think them through. This is why we will expect you and your teams to work open-ended, ill-defined problems, without single “right or wrong” solutions.
- The public trusts that their safety and well-being is protected by relying on the professionals, like engineers. This is why you will need to learn ethics and adhere to a code of ethics; why you need to start paying attention now to how you represent yourself on social networks, and why you need to be aware of the extreme consequences of academic dishonesty.
What do I need to be doing while an engineering student?

- Take your **required courses**.
- Take a selection of **elective courses** that will enrich your skills and marketability, and will make you a well-rounded person.
- **Take your courses seriously** – you need to have a solid understanding of the material in your foundation courses to do well in your third and fourth year courses.
- Learn **project management and group collaboration skills**. This starts in EGR 100 in the first year so that you will already be experienced in these matters when you undertake more complex projects in later courses.
- **Pursue experiential education** – internships, co-ops, undergraduate research and/or study abroad. These experiences enhance your coursework and have become expectations of both employers and graduate schools. Your grades alone are not enough to differentiate you from the student next to you.
- Similarly, find some area of **co-curricular endeavors** (student organizations, clubs, band, volunteerism, tutoring, etc., etc.) that will help you develop your people skills.
- Find some time to **explore other things** you may be interested in. Michigan State has over 500 student organizations, serving every imaginable interest. You will not find these opportunities so closely available after you graduate.
- **Balance** the items above. Finding a job after you graduate or pursuing advanced education will not depend on how many different things are on your resume. They will depend more on the substance and achievements of the things you did do.
- Again, **start thinking now how you represent yourself to the world**. Your potential employers, graduate schools, professional schools and external scholarship funders **will** look you up in cyberspace.

**Questions?** See…

- Your academic advisor
- The Center for Spartan Engineering (experiential education, jobs)
- The Diversity Programs Office
- The Women in Engineering Office
- The Engineering Study Abroad Office
- Spartan Engineering tweets and LinkedIn groups
Getting Connected…to Engineering Disciplines at MSU
What are they? Where do MSU graduates work?

Applied Engineering Sciences (AES)
Broad foundation across all engineering majors; students choose business, telecommunications, sales, or computer science concentrations
Work in: EGR consulting, recruiting, sales, marketing, logistics management

Biosystems Engineering (BE)
Broad biological component, food processing & ecosystems
Work in: food quality & safety, renewable bioenergy, consulting and regulatory agencies

Chemical Engineering (ChE)
Chemistry & engineering applied to full-scale industrial production
Work in: pharmaceuticals, bioenergy, consumer products

Civil Engineering (CE)
Transportation & structures; environmental concentration available
Work with: roads, bridges, water, structures, construction, & infrastructure

Computer Engineering (CpE)
Hardware & software; make computers smaller & faster
Work as: computer & embedded systems architects, real-time system design

Computer Science (CpS)
Software design & development; databases, graphics, webpages, & networks
Work in: cyber security, artificial intelligence, information technology, consulting, project management, & marketing

Electrical Engineering (EE)
Integrated circuits, robotics & control, power, lasers, & materials
Work in: nanotechnology, fiber optic communication systems, automotive & aerospace industries

Materials Science & Engineering (MSE)
Develop new materials & the processes to create them
Work with: metals & ceramics, plastics, & polymers (non-metals)

Mechanical Engineering (ME)
Anything with motion or moving parts, design
Work in: aerospace, automotive, manufacturing, & energy systems
Engineering Undergraduate Academic Curriculum

1. UNIVERSITY REQUIREMENTS

(What every MSU student should know):

☐ How to locate and use Schedule of Courses

☐ How to find course prerequisites

☐ Where to find degree requirements

☐ What academic services are available

☐ How to read your MSU email (and make sure to check it often!)

☐ How to ask for an override (from the department offering the course!)

2. COLLEGE REQUIREMENTS

(What every ENGINEERING student should know):

☐ Where to find major requirements

☐ College of Engineering admission requirements

☐ Where the Diversity Programs Office, The Center, and Undergraduate Studies are located and what they do

☐ What the Engineering Majors are and what you can do with them

☐ Average graduation time is 4.5 years

☐ How to get to and use Degree Navigator and Stu-Info

3. MAJOR REQUIREMENTS

(What you should know about your MAJOR):

☐ What are the course requirements in your major

☐ How to find and utilize job/internship opportunities

☐ At least one faculty member – well enough for a letter of recommendation

☐ How to find and participate in research opportunities

4. CONCENTRATIONS

(What you can do to enhance your EDUCATION):

☐ How to locate and participate in an internship or co-op (and how to get credit for it!)

☐ Where, when, and how to study abroad

☐ How to find and participate in undergraduate research opportunities

☐ What engineering student organizations exist, what they do, and how to participate

☐ How to get information about graduate school

☐ How to participate in service learning opportunities
ENGINEERING

DEGREE PROGRAMS

AND

MAJOR

REQUIREMENTS

The information listed here is current as of May 2010. Students are expected to know departmental policies and course prerequisites and are ultimately responsible for accurately completing degree requirements.

The most current information on major requirements is available at http://www.egr.msu.edu/undergraduate/academics/programs
Applied Engineering Sciences

1. University Requirements: (23-24)
   - Writing, Rhetoric and American Cultures (WRA) 4
   - Integrative Studies in Humanities (IAH) 8
   - Integrative Studies in Social Sciences (ISS) 8
   - Bioscience: BS 111 3

2. College Requirements: (30)
   - CEM 141 General Chemistry 4
   - EGR 100 Introduction to Engineering Design 2
   - EGR 102 Introduction to Engineering Modeling 2
   - MTH 132 Calculus I 3
   - MTH 133 Calculus II 4
   - MTH 234 Multivariable Calculus 4
   - PHY 183 Physics for Scientists & Engineers I 4
   - PHY 184 Physics for Scientists & Engineers II 4

3. Major Requirements: (30)
   A. Complete all of the following courses:
      - ACC 230 Survey of Accounting Concepts 3
      - CE 221 Statics 3
      - CEM 161 Chemistry Laboratory I 1
      - COM 225 Intro to Interpersonal Communication 3
      - EC 201 Introduction to Microeconomics 3
      - EC 202 Introduction to Macroeconomics 3
      - ECE 201 Circuits and Systems I 3
      - EGR 210 Global Sys: Econ, Engr, Environment 3
      - EGR 310 Sustainable Systems Analysis 3
      - EGR 410 System Methodology 3
      - ME 201 Thermodynamics 3
      - ME 280 Graphic Communications 2
      - MGT 325 Management Skills and Processes 3
      - MKT 317 Quantitative Bus Research Methods 3
      - MSE 250 Materials Science and Engineering 3
      - PHY 191 Physics Lab for Scientists, I 1
      - STT 315 Intro to Prob & Statistics for Business 3
   
   B. Select one of the following courses: (3)
      - BE 230 Engr Anlys of Biological Systems 3
      - CE 280 Principles of Environ Engr & Science 3

   Total credits Required for Degree: 120

The requirements listed above apply to students admitted to the major of Applied Engineering Sciences in the Engineering Undergraduate Studies Office (UGS) beginning Fall, 2010. The Engineering Undergraduate Studies Office constantly reviews requirements and reserves the right to make changes as necessary. Consequently, each student is strongly encouraged to consult with his/her adviser to obtain assistance in planning and appropriate schedule of courses. Students who have questions about Applied Engineering Sciences should contact the Engineering Undergraduate Studies Advising Office, 1410 Engineering Building, phone (517) 355-6616 extension 1.

C. Concentrations

In consultation with their academic advisor, students must select one of the following concentrations: computer science, supply chain management, technical sales, or telecommunications. For students interested in computer science, the minimum criteria for acceptance is the completion of Computer Science and Engineering 231 and 260 with a combined grade-point average in those two courses of 3.0. The concentration will be noted on the student’s academic record.

   Computer Science: (18)
      - CSE 231 Introduction to Programming I 4
      - CSE 232 Introduction to Programming II 4
      - CSE 260 Discrete Structures in Computer Science 4

   Supply Chain Management: (15)
      - FI 320 Introduction to Finance 3
      - MKT 313 Personal Selling and Buying Processes 3
      - SCM 371 Procurement & Supply Management 3
      - SCM 372 Manufacturing Planning and Control 3

   Technical Sales: (18)
      - COM 360 Advanced Sales Communication 3
      - COM 483 Practicum in Sales Communication 1
      - FI 320 Introduction to Finance 3
      - MKT 313 Personal Selling and Buying Processes 3
      - MKT 327 Introduction to Marketing 3
      - MKT 383 Sales Management 3
      - SCM 474 Negotiations 2

   Other Electives (Variable)

Last revised May 2010
### Sample Program – Computer Science Concentration

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### Sample Program – Supply Chain Management Concentration

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### Sample Program – Engineering Management Concentration

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Sample Program – Technical Sales Concentration

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Sample Program – Telecommunications Concentration

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Junior Year

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Program Objectives

The Applied Engineering Sciences (AES) major is an undergraduate BS degree program in the MSU College of Engineering. AES is a multidisciplinary program that integrates core studies in mathematics, statistics, and science, core studies in multiple engineering disciplines, and core studies in business fundamentals and management. Built on this strong technical and business base, an AES student completes his or her studies by selecting one of four concentration areas: supply chain management, technical sales and marketing, telecommunications, or computer science.

AES is focused on developing strong problem solvers who have good people skills, and who bring to their workplace an integrated approach to understanding and managing complex business and engineered systems. More specifically, the AES program objectives are for each AES graduate to have the ability to:

a. apply an integrated knowledge of engineering and business to problem solving, and;

b. effectively function at the interfaces of engineering, design, production, procurement, marketing, distribution, sales, and management;

c. effectively function in work teams, including functioning as a manager and a leader;

d. effectively communicate in oral, written, and new media contexts;

e. effectively apply the strengths of a technically based education to all problem solving contexts; and

f. effectively demonstrate the nimbleness and flexibility to respond to new types of problems and new opportunities based on being a life long learner.
Biosystems Engineering
Accredited by the Engineering Accreditation Commission of ABET,
111 Market Place, Suite 1050, Baltimore, MD 21202-4012 – telephone (410) 347-7700.

1. University Requirements (24)
   Writing, Rhetoric and American Cultures (WRA) 4
   Integrative Studies in Humanities (IAH) 8
   Integrative Studies in Social Sciences (ISS) 8
   Bioscience: BS 110 Organisms and Populations 4

2. College Requirements (30)
   CEM 141 General Chemistry 4
   EGR 100 Introduction to Engineering Design 2
   EGR 102 Introduction to Engineering Modeling 2
   MTH 132 Calculus I 3
   MTH 133 Calculus II 4
   MTH 234 Multivariable Calculus 4
   MTH 235 Differential Equations 3
   PHY 183 Physics for Scientists & Engineers I 4
   PHY 184 Physics for Scientists & Engineers II 4

3. Major Requirements: (47)
   a. Complete all of the following courses:
      BE 101 Introduction to Biosystems Engineering 1
      BE 230 Engineering Analysis of Biological Systems 3
      BE 332 Engineering Properties of Biological Materials 3
      BE 333 Biosystems Engineering Laboratory 1
      BE 350 Heat and Mass Transfer in Biosystems 3
      BE 351 Thermodynamics for Biological Engineering 3
      BE 360 Microbial Systems Engineering 3
      BE 385 Egr Design & Optimization for Biological Sys 3
      BE 485 Biosystems Design Techniques 3
      BE 487 Biosystems Design Project (W) 3
      BS 111 Cells and Molecules 3
      CE 221 Statics 3
      CE 321 Introduction to Fluid Mechanics 4
      CEM 143 Survey of Organic Chemistry 4
      CEM 161 Chemistry Laboratory I 1
      ECE 345 Electronic Instrumentation and Systems 3
      STT 351 Probability and Statistics for Engineering 3
   b. Select one of the following courses: (3-4)
      MMG 301 Introductory Microbiology 3
      PLB 301 Introductory Plant Physiology 3
      PSL 250 Introductory Physiology 4
   c. Select one of the following courses: (3)
      CSS 440 Soil Biophysics 3
      FOR 404 Forest and Agricultural Ecology 3
      FSC 440 Food Microbiology 3
      MMG 425 Microbial Ecology 3
      MMG 445 Microbial Biotechnology 3
      PSL 425 Physiological Biophysics 3
   d. Select three of the following courses (9):
      BE 445 Biosensors for Medical Diagnostics 3
      BE 456 Electric Power and Control 3
      BE 469 Sustainable Bioenergy Systems 3
      BE 477 Food Engineering: Fluids 3
      BE 478 Food Engineering: Solids 3
      BE 481 Land & Water Conservation Engineering 3
      BE 482 Non-point Source Pollution Control 3
      CHE 468 Biomass Conversion Engineering 3
   e. Technical Electives (6)
      Complete at least 6 credits selected from a list of approved engineering, technical, or science electives available from the academic adviser. Approved courses include, but are not limited to, those listed in the various concentrations/specializations listed below and additional courses from item d. above.

Optional Concentrations
The department offers several concentrations for students who wish to focus on a specific application area in the discipline. The concentrations are available to, but not required of, any student enrolled in the Bachelor of Science program in Biosystems Engineering. Courses completed to satisfy requirement 3. above may also be used to satisfy the requirements of a concentration. Upon completion of the required courses for a given concentration, certification will appear on the student's official transcript.

Bioenergy Engineering Concentration (15-16)
To earn a Bachelor of Science degree in Biosystems Engineering with a bioenergy engineering concentration, students must complete requirements 1., 2., and 3. above and the following:

All of the following courses: (12)
   BE 469 Sustainable Bioenergy Systems 3
   CHE 468 Biomass Conversion Engineering 3
   CSS 467 Bioenergy Feedstock Production 3
   MMG 445 Microbial Biotechnology 3
   CHE 481 Biochemical Engineering 3
   CHE 882 Advanced Biochemical Engineering 3
   CHE 883 Multidisciplinary Bioprocessing Laboratory 3
   FW 829 The Economics of Environmental Resources 3
   GLG 471 Applied Geophysics 4
   MC 450 International Environmental Law & Policy 3
   ME 417 Design of Alternative Energy Systems 3
Biomedical Engineering Concentration (14-15)
To earn a Bachelor of Science degree in Biosystems Engineering with a biomedical engineering concentration, students must complete requirements 1., 2., and 3. above and the following:

All of the following courses (9):
BE 445 Biosensors for Medical Diagnostics 3
ME 494 Biofluid Mechanics and Heat Transfer 3
PSL 425 Physiological Biophysics 3

Two courses from the following: (5-6)
BLD 204 Mechanisms of Disease 3
BLD 430 Molecular Laboratory Diagnostics 2
BLD 434 Clinical Immunology 3
BLD 450 Eukaryotic Pathogens 3
MSE 425 Biomaterials and Biocompatibility 3
PLB 400 Introduction to Bioinformatics 3

Food Engineering Concentration (15-16)
To earn a Bachelor of Science degree in Biosystems Engineering with a food engineering concentration, students must complete requirements 1., 2., and 3. above and the following:

All of the following courses (9):
BE 477 Food Engineering: Fluids 3
BE 478 Food Engineering: Solids 3
FSC 440 Food Microbiology 3

Two of the following courses: (6-7)
At least one course must be at the 400-level
BMB 200 Introduction to Biochemistry 4
FSC 211 Principles of Food Science 3
FSC 401 Food Chemistry 3
FSC 430 Food Processing: Fruits & Vegetables 3
FSC 431 Food Processing: Cereals 3
FSC 432 Food Processing: Dairy Foods 3
FSC 433 Food Processing: Muscle Foods 3

Ecosystems Engineering Concentration: (15)
To earn a Bachelor of Science degree in Biosystems Engineering with an ecosystems engineering concentration, students must complete requirements 1., 2., and 3. above and the following:

All of the following courses: (9)
BE 481 Land and Water Conservation Engr 3
BE 482 Non-point Source Pollution Control 3
MMG 425 Microbial Ecology 3

Two of the following courses: (6)
At least one course must be at the 400-level
CE 280 Principles of Env. Engineering and Sci 3
CE 422 Applied Hydraulics 3
CE 487 Microbiology for Env. Sci. and Engineering 3
CSS 210 Fundamentals of Soil Science 3
CSS 440 Soil Biophysics 3
CSS 455 Pollutants in the Soil Environment 3
FW 443 Restoration Ecology 3

Other Electives (Variable)

Total Credits Required for Degree 128

These requirements are effective for students admitted to the Biosystems Engineering major beginning Fall 2009. The Department of Biosystems and Agricultural Engineering (BAE) constantly reviews program requirements and reserves the right to make changes as necessary. Consequently, each student is strongly encouraged to consult with his/her adviser to obtain assistance in planning an appropriate schedule of courses. Students who have questions about Biosystems Engineering should contact the Biosystems Engineering Advising Office, 1410 Engineering Building, phone (517) 355-6616 extension 1.

Last revised May 2010
Biosystems Engineering

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**Program Educational Objectives**

The overall purpose of the MSU Biosystems Engineering Undergraduate Program is to prepare graduates who will integrate and apply principles of engineering and biology to a wide variety of globally important problems. To achieve that purpose, the primary objectives of the Biosystems Engineering Program are to prepare graduates to:

- identify and solve problems at the interface of biology and engineering, using modern engineering techniques and the systems approach, and
- analyze, design, and control components, systems, and processes that involve critical biological components.

Additionally, the Biosystems Engineering Program is designed to help graduates succeed in diverse careers by developing a professional foundation that includes vision, adaptability, creativity, a practical mindset, effective communication skills for technical and non-technical audiences, the ability to work in diverse, cross-disciplinary teams, and a commitment to sustainability, continuing professional growth, and ethical conduct.

Approved by the Biosystems Engineering faculty (26 February 2010), the Biosystems Engineering Industry Advisory Board (15 April 2010), and the Biosystems Engineering Student Group (21 April 2004; pending approval of updated version)

Last revised April 2010
Chemical Engineering

Accredited by the Engineering Accreditation Commission of ABET.
111 Market Place, Suite 1050, Baltimore, MD 21202-4012 - telephone (410) 347-7700.

1. University Requirements: (23)
   - Writing, Rhetoric and American Cultures (WRA) 4
   - Integrative Studies in Humanities (IAH) 8
   - Integrative Studies in Social Sciences (ISS) 8
   - Bioscience: BS 111 Cells and Molecules 3

2. College Requirements: (30)
   - CEM 151 General and Descriptive Chemistry 4
   - EGR 100 Introduction to Engineering Design 2
   - EGR 102 Introduction to Engineering Modeling 2
   - MTH 132 Calculus I 3
   - MTH 133 Calculus II 4
   - MTH 134 Multivariable Calculus 4
   - MTH 235 Differential Equations 3
   - PHY 183 Physics for Scientists & Engineers I 4
   - PHY 184 Physics for Scientists & Engineers II 4

3. Major Requirements: (54)
   A. Complete all of the following courses:
      - CEM 152 Principles of Chemistry 3
      - CEM 161 Chemistry Laboratory I 1
      - CEM 162 Chemistry Laboratory II 1
      - CEM 351 Organic Chemistry I 3
      - CEM 352 Organic Chemistry II 3
      - CEM 355 Organic Laboratory I 2
      - CHE 201 Material and Energy Balances 3
      - CHE 210 Modeling and Analysis of Transport Phenomena 3
      - CHE 301 Chemical Engineering as a Profession 1
      - CHE 311 Fluid Flow and Heat Transfer 3
      - CHE 312 Mass Transfer and Separations 4
      - CHE 316 Laboratory Practice and Statistical Analysis 4
      - CHE 321 Thermodynamics for Chemical Engineering 4
      - CHE 431 Chemical Reaction Engineering 4
      - CHE 432 Process Analysis and Control 3
      - CHE 433 Process Design and Optimization I 4
      - CHE 434 Process Design and Optimization II 2
      - CHE 473 Chemical Engr Princ in Polymers & Mats Sys 3
   E. Technical Electives: (6)
      Students must complete at least 6 credits of technically oriented subject-related courses approved by the student's advisor. Acceptable subjects include, but are not limited to, composites processing or biochemical engineering (in addition to that required in 3. c. above), electronic materials, environment, advanced mathematics, transport phenomena, advanced chemistry, foods, legal and regulatory issues, advanced materials, advanced biology, statistics, biomedical engineering, bioenergy, and polymers.
      Note: Elective courses in item 3. e. must include at least 3 credits of engineering topics, which includes courses taught in the College of Engineering as well as courses taught in advanced mathematics, advanced chemistry, advanced biology, advanced statistics, and advanced physics. If Biochemistry and Molecular Biology 462 is taken to fulfill requirement 3.b. it will count as technical elective credit in item 3.e.

Concentrations in Chemical Engineering

Concentrations are available to, but not required of, any student enrolled in the Bachelor of Science degree program in chemical engineering. The concentration will be noted on the student's transcript. Completing the Bachelor of Science degree in chemical engineering with a concentration may require more than 128 credits. **Students who complete a concentration are not required to complete Technical Electives.**

Biochemical Engineering Concentration: (11-15)

To earn a Bachelor of Science degree in Chemical Engineering with a biochemical engineering concentration, students must complete requirements 1., 2., 3.a., 3.b., 3.d.

All of the following courses: (6)
   - CHE 481 Biochemical Engineering 3
   - MMG 301 Introductory Microbiology 3

Two or three of the following courses. Students who choose BMB 401 from 3.b. above must select three courses from the following. Students who choose BMB 461 and 462 from 3.b. above must select two courses: (5-9)
   - BMB 829 Methods Of Macromolecular Anlys & Synthesis 2
   - CHE 882 Advanced Biochemical Engineering 3
   - CHE 883 Multidisciplinary Bioprocessing Laboratory 3
   - MMG 409 Eukaryotic Cell Biology 3
   - MMG 421 Prokaryotic Cell Physiology 3
   - MMG 431 Microbial Genetics 3
   - MMG 445 Microbial Biotechnology 3

B. One of the following groups: (4-6)
   Group 1
      - BMB 401 Basic Biochemistry 4
   Group 2
      - BMB 461 Biochemistry I 3
      - BMB 462 Biochemistry II 3
   C. Select one of the following courses: (3)
      - CHE 472 Composite Materials Processing 3
      - CHE 481 Biochemical Engineering 3
   D. Select one of the following courses: (3)
      - CEM 483 Quantum Chemistry 3
      - CEM 484 Molecular Thermodynamics 3
Bioenergy Concentration: (15-16)
To earn a Bachelor of Science degree in Chemical Engineering with a bioenergy concentration, students must complete requirements 1., 2., 3.a., 3.b., 3.d. above and the following:

All of the following courses: (12)
BE 469 Sustainable Bioenergy Systems 3
CHE 468 Biomass Conversion in Engineering 3
CHE 481 Biochemical Engineering 3
CSS 467 Bioenergy Feedstock Production 3

One of the following courses (3-4 credits):
AEC 829 The Economics of Environmental Resources 3
CHE 882 Advanced Biochemical Engineering 3
CHE 883 Multidisciplinary Bioprocessing Laboratory 3
GLG 471 Applied Geophysics 4
MC 450 Int’l Environmental Law and Policy 3
MMG 445 Microbial Biotechnology 3

Food Science Concentration: (12-13)
To earn a Bachelor of Science degree in Chemical Engineering with a food science concentration, students must complete requirements 1., 2., 3.a., 3.b., 3.c., 3.d. above and the following:

All of the following courses: (9)
FSC 401 Food Chemistry 3
FSC 440 Food Microbiology 3
MMG 301 Introductory Microbiology 3

One of the following courses: (3-4)
BE 477 Food Engineering: Fluids 3
BE 478 Food Engineering: Solids 3
FSC 325 Food Processing: Unit Operations 4
FSC 455 Food Analysis 3
FSC 470 Integrated Approaches to Food Product Dev 3

Biomedical Engineering Concentration: (15-16)
To earn a Bachelor of Science degree in Chemical Engineering with a biomedical engineering concentration, students must complete requirements 1., 2., 3.a., 3.b., 3.d. above and the following:

All of the following courses: (9)
CHE 481 Biochemical Engineering 3
MMG 409 Eukaryotic Cell Biology 3
PSL 431 Human Physiology I 3

Two of the following courses: (6-7)
BMB 471 Biochemistry Laboratory (W) 3
CHE 883 Multidisciplinary Bioprocessing Laboratory 3
ME 494 Biofluid Mechanics and Heat Transfer 3
ZOL 341 Fundamental Genetics 4

Polymer Science and Engineering Concentration: (16-17)
To earn a Bachelor of Science degree in Chemical Engineering with a polymer science and engineering concentration, students must complete requirements 1., 2., 3.a., 3.b., 3.d. above and the following:

All of the following courses: (10)
CE 221 Statics 3
CHE 472 Composite Materials Processing 3
ME 222 Mechanics of Deformable Solids 4

Two of the following courses: (6-7)
CHE 871 Materials Surfaces and Interfaces 3
CHE 872 Polymers & Composites: Mfg, Strc & Prfrrncc 3
MSE 370 Physical Processing of Materials 3
MSE 426 Introduction to Composite Materials 3
PKG 323 Packaging with Plastics 4

Environmental Concentration: (15)
To earn a Bachelor of Science degree in Chemical Engineering with an environmental concentration, the student must complete requirements 1.2., and 3. a., 3.b., 3.d. above and the following:

All of the following courses: (6)
CE 280 Principles of Environmental Engr and Science 3
CHE 481 Biochemical Engineering 3

Three of the following courses: (9)
CE 481 Environ Chemistry: Equilibrium Concepts 3
CE 483 Unit Operations & Processes in Envrn Engr. 3
CE 485 Landfill Design 3
EEP 255 Ecological Economics 3
EEP 320 Environmental Economics 3
EEP 405 Corporate Environmental Management 3
ESA 200 Intro to Environmental Studies & Agriscience 3
ESA 430 Environmental and Natural Resource Law 3
ZOL 446 Environmental Issues and Public Policy 3

Other Electives (Variable)

Total Credits Required for Degree
128

These requirements are effective for students admitted to the Chemical Engineering major beginning Fall 2009. The Department of Chemical Engineering and Materials Science constantly reviews program requirements and reserves the right to make changes as necessary. Consequently, each student is strongly encouraged to consult with his/her adviser to obtain assistance in planning an appropriate schedule of courses. Students who have questions about Chemical Engineering should contact the Chemical Engineering and Materials Science Department Advising Office, 1415 Engineering Building, phone (517) 355-6616 extension 1.

Some courses may have prerequisites, which are not otherwise required in the program. Students should check course descriptions to ensure they are aware of prerequisites.

Last revised May 2010
Sample Program

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</table>

CHE Program Educational Objectives

The undergraduate program in chemical engineering builds a strong foundation for the professional development of its students and prepares them to meet the technological challenges of the future. With a bachelor’s degree, the graduates are well equipped for a wide variety of positions as practicing chemical engineers or for graduate studies in competitive engineering and scientific disciplines. The intensive program promotes continued learning and professional development by providing the proper knowledge and stimulation in an ideal setting for personal growth. The program emphasizes its historic, nationally recognized strength in chemical process design, yet draws on the scholarly accomplishments of its faculty to integrate traditional chemical engineering topics with specialized studies in the contemporary fields of materials, bioprocessing, environmental engineering, biomedical engineering, and food engineering.

The faculty of the Chemical Engineering Program is committed to sharing the responsibility of learning with the students, providing a rigorous academic environment that encourages active learning, high quality student performance, and ethical and professional conduct. Through the integration of the knowledge and skills acquired in a demanding set of courses, extracurricular experiences, and faculty expertise and scholarship, the Chemical Engineering Program has established the following objectives.

The Chemical Engineering Program will prepare its graduates

- to be successful in the practice of chemical engineering or in advanced studies in engineering, scientific or complementary disciplines;
- to assume leadership roles in industry and/or their communities;
- to contribute to the economic environment of their communities; and
- to maintain career skills through life-long learning.
Civil Engineering

Accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1090, Baltimore, MD 21202-4012 - telephone (410) 347-7700

1. University Requirements: (23)
   Writing, Rhetoric and American Cultures (WRA) 4
   Integrative Studies in Humanities (IAH) 8
   Integrative Studies in Social Sciences (ISS) 8
   Bioscience (one of the following): 3-4
   BS 110, BS 111, ENT 205, MMG 201,
   MMG 301, PLB 105, PSL 250, ZOL 141

2. College Requirements: (30)
   CEM 141 General Chemistry 4
   OR
   CEM 151 General and Descriptive Chemistry 4
   EGR 100 Introduction to Engineering Design 2
   EGR 102 Introduction to Engineering Modeling 2
   MTH 132 Calculus I 3
   MTH 133 Calculus II 4
   MTH 234 Multivariable Calculus 4
   MTH 235 Differential Equations 3
   PHY 183 Physics for Scientists & Engineers I 4
   PHY 184 Physics for Scientists & Engineers II 4

3. Major Requirements: (40)
   A. Complete all of the following courses:
      CE 221 Statics 3
      CE 271 Introduction to Civil Engineering 4
      CE 280 Principles of Environ Engr and Science 3
      CE 305 Introduction to Structural Analysis & Design 4
      CE 312 Soil Mechanics 4
      CE 321 Introduction to Fluid Mechanics 4
      CE 337 Civil Engineering Materials I 4
      CE 341 Transportation Engineering 3
      CE 495 Senior Design in Civil Engineering 3
      CEM 161 Chemistry Laboratory I 1
      ME 222 Mechanics of Deformable Solids 4
      STT 351 Probability and Statistics for Engineering 3

   B. Complete one of the following courses: (3)
      CE 461 Computational Methods in Civil Engineering 3
      ME 361 Dynamics 3

   C. Complete one of the following courses: (3)
      BE 351 Environmental Thermodynamics 3
      ECE 345 Electronic Instrumentation and Systems 3
      ME 201 Thermodynamics 3
      MSE 250 Materials Science and Engineering 3

   D. Major Tracks: (18)
      Complete 18 credits of electives as specified below. At least 9 credits of one primary track must be completed as specified. The additional 9 credits must include one course each from three other (and different) tracks. Construction Engineering and Management courses may count towards the additional 9 credits. See the Civil Engineering Academic Adviser for specific track sample programs.

      Environmental Track: (9)
      1. Complete both of the following courses:
         CE 481 Environ Chem: Equilibrium Concepts 3
         CE 483 Unit Operations & Proc in Env Engr 3
      2. Complete one of the following courses:
         CE 421 Engineering Hydrology 3
         CE 485 Landfill Design 3
         CE 487 Microbiology for Environ Science & Engr 3

      Geotechnical Track: (9)
      1. Complete both of the following courses:
         CE 418 Geotechnical Engineering 3
         CE 485 Landfill Design 3
      2. Complete one of the following courses:
         CE 431 Pavement Design and Analysis I 3
         CE 815 Selected Topics in Geotechnical Engr 3
         CE 818 Advanced Geotechnical Design 3

      Pavements Track: (9)
      1. Complete both of the following courses:
         CE 431 Pavement Design and Analysis I 3
         CE 432 Pavement Rehabilitation 3
      2. Complete one of the following courses:
         CE 418 Geotechnical Engineering 3
         CE 831 Advanced Concrete Pavemnt Anlys & Desn 3
         CE 832 Advanced Asphalt Pavemnt Anlys & Design 3

      Structures Track: (9)
      1. Complete both of the following courses:
         CE 405 Design of Steel Structures 3
         CE 406 Design of Concrete Structures 3
      2. Complete one of the following courses:
         CE 400 Structural Mechanics 3
         CE 805 Advanced Design of Steel Structures 3
         CE 806 Advanced Structural Concrete Design 3

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1 Choose CEM 151 if pursuing Environmental Engineering Concentration.
2 CE 337, CE 341 CE 461 and ME 361 may not be required if pursuing Environmental Engineering Concentration.
3 Choose BE 351 or ME 201 if pursuing Environmental Engineering Concentration.
Transportation Track: (9)
1. Complete both of the following courses:
   CE 448 Transportation Planning 3
   CE 449 Highway Design 3
2. Complete one of the following courses:
   CE 431 Pavement Design and Analysis I 3
   CE 432 Pavement Rehabilitation 3
   CE 444 Principles of Traffic Engineering 3

Water Resources Track: (9)
1. Both of the following courses:
   CE 421 Engineering Hydrology 3
   CE 422 Applied Hydraulics 3
2. One of the following courses:
   CE 423 Applied Hydrologic Analysis & Design 3
   CE 822 Groundwater Modeling 3
   GLG 411 Hydrogeology 3
   GLG 412 Glacial Geology & Rcrd of Climate Chng 4

General Track
Students may choose a general track in fulfillment of the Primary Track requirement. Students must complete 12 credits with courses from each of four different tracks above. Students must also complete 6 additional credits across all tracks which may include course work from Construction Engineering and Management courses below.

Construction Engineering and Management Courses
   CE 471 Construction Engr-Equip, Mthds & Plng 3
   CMP 411 Construction Project Scheduling 3
   CMP 415 Cost Estimating Analysis 3
   CMP 423 Construction Project Management 3

Enrollment in CMP courses require the approval of the Construction Management Program department.

Other Electives (Variable)

Total Credits Required for Degree 128

The requirements listed above apply to students admitted to the Department of Civil & Environmental Engineering (CEE) beginning Fall 2009. The Department of Civil & Environmental Engineering (CEE) constantly reviews program requirements and reserves the right to make changes as necessary. Consequently, each student is strongly encouraged to consult with his/her adviser to obtain assistance in planning an appropriate schedule of courses. Students who have questions about Civil Engineering should contact the Civil & Environmental Engineering Department Advising Office, 3579 Engineering Building, phone (517) 355-3274. For scheduling academic advising appointments visit: https://ntweb11.ais.msu.edu/AAS/

Last revised May 2010
Environmental Engineering Concentration
for Civil Engineering

The environmental engineering concentration is available to students who are enrolled in the Bachelor of Science degree program in civil engineering. Students who elect this concentration must complete the following courses. The concentration will be noted on the student’s transcript. See the Civil Engineering Academic Adviser for a sample program specific to the Environmental Engineering Concentration.

1. Complete all of the following courses: (23)
   - CE 480 Environmental Measurements Laboratory 1
   - CE 481 Environmental Chemistry: Equilibrium Concepts 3
   - CE 483 Unit Operations & Proc in Env Engr 3
   - CE 485 Landfill Design 3
   - CE 487 Microbiology for Environ Science Engr 3
   - CEM 151 General and Descriptive Chemistry 4
   - CEM 152 Principles of Chemistry 3
   - CHE 201 Material and Energy Balances 3
   
   Note: CEM 151 may be used to satisfy both the requirements for the Environmental Engineering concentration and the requirements for the Bachelor of Science in Civil Engineering. CE 481, 483 and 485 may be used to satisfy both the requirement for the Environmental Engineering concentration and 9 credits of the track requirements for the Bachelor of Science in Civil Engineering.

2. Complete one of the following courses: (3)
   - BE 351 Thermodynamics for Biological Engineering 3
   - CHE 321 Thermodynamics for Chemical Engr 4
   - ME 201 Thermodynamics 3
   
   Note: BE 351 and ME 201 may be used to satisfy both the requirements for the Environmental Engineering concentration and the requirements for the Bachelor of Science in Civil Engineering.

3. Complete one of the following courses: (3)
   - CE 421 Engineering Hydrology 3
   - CE 422 Applied Hydraulics 3
   
   Note: CE 421 or CE 422 may be used to satisfy both the requirements for the Environmental Engineering concentration and 3 credits of the track requirements for the Bachelor of Science in Civil Engineering.

4. Complete one of the following courses: (3-4)
   - CE 337 Civil Engineering Materials I 4
   - CE 341 Transportation Engineering 3
   - CE 461 Computational Methods in Civil Engineering 3
   - CEM 251 Organic Chemistry I 3
   - CEM 351 Organic Chemistry I 3
   - ME 361 Dynamics 3

5. Major Tracks
   Complete 6 credits from two Major Tracks (d.), excluding the Environmental Track and the Water Resources Track. Eighteen credits total are required from the Major Track; 9 credits from Section 1 above, 3 credits from Section 3 above, plus an additional 6 credits from two other tracks.

Last revised May 2010
Civil Engineering
General Sample Program

(A different sample program applies to the Environmental Engineering Concentration. See the Civil Engineering Academic Adviser for that sample program.)

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Civil Engineering

The general sample civil engineering course program above will satisfy the course requirements for a BS degree in civil engineering, except for the BS degree in civil engineering with the environmental engineering concentration. Students interested in pursuing this concentration should consult with the civil engineering academic adviser. The sample civil engineering course program recommends freshman and sophomore year course work that is common for all areas of specific civil engineering interest except for the environmental engineering concentration. Please note that it is strongly recommended that CE 221 and ME 222 be taken in the sophomore year.

Statement of Program Educational Objectives

The Department of Civil and Environmental Engineering provides opportunities to obtain the knowledge, skills and professional prospective needed for:
- entry to civil engineering practice and the pursuit of advanced studies;
- life-long learning;
- continuing professional development and leadership; and
- licensure;
all leading to career success.

Last revised August 2008
Computer Engineering

Accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 – telephone (410) 347-7700.

1. University Requirements (23-24)
   - Writing, Rhetoric and American Cultures (WRA) 4
   - Integrative Studies in Humanities (IAH) 8
   - Integrative Studies in Social Sciences (ISS) 8
   - Bioscience (one of the following):
     - BS 110, BS 111, ENT 205, MMG 201, MMG 301, PLB 105, PSL 250, ZOL 141 3-4

2. College Requirements: (28)
   - CEM 141 General Chemistry 4
   - EGR 100 Introduction to Engineering Design 2
   - MTH 132 Calculus I 3
   - MTH 133 Calculus II 4
   - MTH 234 Multivariable Calculus 4
   - MTH 235 Differential Equations 3
   - PHY 183 Physics for Scientists & Engineers I 4
   - PHY 184 Physics for Scientists & Engineers II 4

3. Major Requirements: (69)
   A. Complete one of the following courses: (1)
      - CEM 161 Chemistry Laboratory I 1
      - PHY 191 Physics Laboratory for Scientists I 1
   B. All of the following courses: (44)
      - CSE 231 Introduction to Programming I 4
      - CSE 232 Introduction to Programming II 4
      - CSE 260 Discrete Structures in Computer Sci 4
      - CSE 331 Algorithms and Data Structures 3
      - CSE 410 Operating Systems 3
      - ECE 201 Circuits and Systems I 3
      - ECE 202 Circuits and Systems II 3
      - ECE 203 Electronic Circuits and Systems Lab 1
      - ECE 230 Digital Logic Fundamentals 3
      - ECE 280 Electrical Engineering Analysis 3
      - ECE 302 Electronic Circuits 3
      - ECE 303 Electronics Laboratory 1
      - ECE 331 Microprocessors & Digital Systems 4
      - ECE 390 Ethics, Professsionalism and Cont. Issues 1
      - ECE 480 Senior Design 4

   C. Major Electives: (24)
      - Complete 24 credits of electives as specified below. At least 18 credits must be from core and focus track electives combined. Additional credits to meet the 24 credit requirement may be taken from other courses listed below, any 400-level Computer Science and Engineering (CSE) or Electrical and Computer Engineering (ECE) courses, or by completing an experiential education substitution obtained through engineering cooperative education or independent study.

   Core Electives: (6)
   - At least 6 credits from the following:
     - ECE 410 VLSI Design (L) 4
     - CSE 420 Computer Architecture 3
     - CSE 422 Computer Networks 3

   Focus Track Electives: (12)
   - At least 12 credits from the following:
     - Hardware
       - ECE 402 Appl of Analog Integrated Circuits (L) 4
       - ECE 411 Electronic Design Automation (L) 4
       - ECE 412 Intro to Mixed-Signal Circuits Design (L) 4
     - Software
       - ECE 366 Introduction to Signal Processing 3
       - CSE 335 Object-oriented Software Design 3
       - CSE 450 Translation of Programming Languages 3
       - CSE 471 Media Processing & Multimedia Computing 3

   Recommended Electives: (6)
   - At least 6 additional credits from above Core or Focus areas or from the following courses:
     - ECE 305 Electromagnetic Fields & Waves I 4
     - ECE 313 Control Systems 3
     - ECE 404 Radio Frequency Electronic Circuits 4
     - ECE 415 Computer Aided Manufacturing 3
     - ECE 416 Digital Control 3
     - ECE 457 Communication Systems 3
     - ECE 458 Communication Systems Laboratory 1
     - ECE 466 Digital Signal Processing & Filter Desn 3
     - ECE 474 Principles of Electronics Devices 3

   Experiential Education Substitution
   Students may use registered “out of classroom” experiences to waive one 400-level requirement outside of the major elective requirement. This is a combination of 3 or more experiences documented by pre-approved EGR/ECE credits (EGR 393, ECE 490/499).

   Other Electives (Variable)

Total Credits Required for Degree 128
Computer Engineering
Sample Program

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Program Objectives

The bachelor's degree in electrical/computer engineering provides its graduates with a solid foundation on which they can build successful and sustainable careers in the ever-changing global work environment. The program prepares its graduates for a variety of career paths including engineering positions directly after program completion, entry to engineering graduate school, and entry to other professional graduate-level schools, and eventual leadership in technical, organizational, and entrepreneurial arenas.

Specifically, the electrical/computer engineering program prepares its graduates to become successful in:

- maintaining and increasing their technical and/or broad expertise through lifelong learning;
- using/applying their continual improving expertise in the practice of electrical/computer engineering or a related career; and
- sharing their expertise to the benefit of the larger community.
Computer Science

1. University Requirements: (20)
   Writing, Rhetoric and American Cultures (WRA)  4
   Integrative Studies in Humanities (IAH)  8
   Integrative Studies in Social Sciences (ISS)  8

2. College Requirements (25)
   CSE 231 Introduction to Programming I  4
   EGR 100 Introduction to Engineering Design  2
   MTH 132 Calculus I  3
   MTH 133 Calculus II  4
   MTH 234 Multivariable Calculus  4
   PHY 183 Physics for Scientists & Engineers I  4
   PHY 184 Physics for Scientists & Engineers II  4

3. Major Requirements (28)
   A. Bioscience: (4-6)
      Select one course from Group 1 and one course from Group 2.
      A selection of BS 110 satisfies both Group 1 and Group 2.

   Group 1
   BS 110 Organisms & Populations  4
   BS 111 Cells & Molecules  3
   ENT 205 Pests, Society & Environment  3
   MMG 201 Fundamentals of Microbiology  3
   PLB 105 Plant Biology  3
   PSL 250 Introductory Physiology  4
   ZOL 141 Introductory Human Genetics  3

   Group 2
   BS 110 Organisms & Populations  4
   BS 111L Cells and Molecular Biology Laboratory  2
   CEM 161 Chemistry Laboratory I  1
   CEM 162 Chemistry Laboratory II  1
   PHY 191 Physics Laboratory for Scientists I  1
   PHY 192 Physics Laboratory for Scientists II  1
   PLB 106 Plant Biology Laboratory  1

   B. Complete all of the following: (32)
   CSE 100 Computer Science as a Profession  1
   CSE 231 Introduction to Programming I  4
   CSE 232 Introduction to Programming II  4
   CSE 260 Discrete Structures in Computer Science  4
   CSE 320 Computer Organization and Architecture  3
   CSE 331 Algorithms and Data Structures  3
   CSE 335 Object-Oriented Software Design  3
   CSE 410 Operating Systems  3
   CSE 498 Collaborative Design (W)  4
   STT 351 Probability and Statistics for Engineering  3

   C. Select five of the following courses: (15)
      Students may substitute two of the five courses with
      mathematics or statistics courses. All substitutions must be
      preapproved by the student’s academic adviser.
      CSE 420 Computer Architecture  3
      CSE 422 Computer Networks  3
      CSE 425 Introduction to Computer Security  3
      CSE 435 Software Engineering  3
      CSE 440 Introduction to Artificial Intelligence  3
      CSE 450 Translation of Programming Languages  3
      CSE 452 Organization of Programming Languages  3
      CSE 460 Computability & Formal Language Theory  3
      CSE 471 Media Processing & Multimedia Computing  3
      CSE 472 Computer Graphics  3
      CSE 475 Introduction to Computational Linguistics  3
      CSE 480 Database Systems  3
      CSE 484 Information Retrieval  3

   Required Cognate: (15)
   Cognates in the following areas are available to students in
   Computer Science: business, communication arts and sciences,
   foreign language, mathematics, the natural sciences, philosophy,
   psychology, the social sciences, and telecommunication.
   Students may complete cognates in other areas with the approval
   of the Department of Computer Science and Engineering
   academic adviser. The cognate should enhance the student’s
   ability to apply analytical procedures in a specific subject area

   The cognate requires a minimum of four courses totaling 15 or
   more credits outside the College of Engineering selected from (1)
   or (2) below. The academic adviser of the Department of
   Computer Science and Engineering must pre approve both the
   cognate and the cognate courses..

   Cognate 1
   At least 6 of the 15 credits must be in courses at the 300-400
   level. The cognate in The Eli Broad College of Business requires
   a specific set of courses: ACC 230, EC 210, FI 320, GBL 323, and
   MKT 327.

   Cognate 2
   A sequence of at least four courses in a foreign language.

   Other Electives (Variable)

   Total Credits Required for Degree  120

   The requirements listed above apply to students admitted to the
   major of Computer Science in the Department of Computer
   Science and Engineering beginning Fall 2008. The Department of
   Computer Science and Engineering (CSE) constantly reviews
   program requirements and reserves the right to make changes as
   necessary. Consequently, each student is strongly encouraged to
   consult with his/her advisor to obtain assistance in planning an
   appropriate schedule of courses. Students who have questions
   about Computer Science should contact the Computer Science
   and Engineering Department Advising Office, 3115 Engineering
   Building, phone (517) 353-3148.

   Last revised May 2010

Some courses may have prerequisites, which are not otherwise
required in the program. Students should check course
descriptions to ensure they are aware of prerequisites.
## Computer Science

### Sample Program

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### Program Objectives

A graduate of the MSU Computer Science Program should be prepared to:

1. apply fundamental computing principles and software development skills to the design and implementation of systems that meet specifications.
2. use computing to solve complex problems.
3. be successful in a computing-related profession or graduate study.
4. communicate effectively with a range of audiences.
5. be an effective team member.
6. act professionally and ethically in the global workplace.
7. be actively engaged in learning and applying new ideas and technologies as the field evolves.

Last revised May 2008
Electrical Engineering

Accredited by the Engineering Accreditation Commission of ABET,
111 Market Place, Suite 1050, Baltimore, MD 21202-4012 - telephone (410) 347-7700

1. University Requirements: (23-24)
Writing, Rhetoric and American Cultures (WRA) 4
Integrative Studies in Humanities (IAH) 8
Integrative Studies in Social Sciences (ISS) 8
Bioscience (one of the following):
   BS 110, BS 111, ENT 205, MMG 201, MMG 301, PLB 105, PSL 250, ZOL 141  3-4

2. College Requirements:  (30)
CEM 141 General Chemistry 4
EGR 100 Introduction to Engineering Design 2
EGR 102 Introduction to Engineering Modeling 2
MTH 132 Calculus I 3
MTH 133 Calculus II 4
MTH 234 Multivariable Calculus 4
MTH 235 Differential Equations 3
PHY 183 Physics for Scientists & Engineers I 4
PHY 184 Physics for Scientists & Engineers II 4

3. Major Requirements:  (44)
A. Complete one of the following courses: (1)
   CEM 161 Chemistry Laboratory I 1
   PHY 191 Physics Laboratory for Scientists I 1

B. Complete all of the following courses:  (40)
   CSE 251 Programming in C 1
   ECE 201 Circuits and Systems I 3
   ECE 202 Circuits and Systems II 3
   ECE 203 Electronic Circuits and Systems Lab 1
   ECE 230 Digital Logic Fundamentals 3
   ECE 280 Electrical Engineering Analysis 3
   ECE 302 Electronic Circuits 3
   ECE 303 Electronics Laboratory 1
   ECE 305 Electromagnetic Fields & Waves I 4
   ECE 313 Control Systems 3
   ECE 320 Energy Conversion & Pwr Electronics 3
   ECE 331 Microprocessors & Digital Systems 4
   ECE 366 Introduction to Signal Processing 3
   ECE 390 Ethics, Profssnlism and Cont. Issues 1
   ECE 480 Senior Design 4

C. Select one of the following courses: (3)
   CE 221 Statics 3
   ME 201 Thermodynamics 3

D. Major Electives (18)
A minimum of six courses totaling a minimum of 18 credits, of 3- or 4-credits each, selected from at least four different areas. A laboratory course ("L") must be included. Students may substitute, for one of the six required courses, a 3- or 4-credit experiential education experience obtained in a minimum of three out-of-classroom experiences through engineering cooperative education or independent study. Students interested in the experiential education experience must contact the department for approval.

Electromagnetics
   ECE 405 Electromagnetic Fields and Waves II (L) 4
   ECE 407 Electromagnetic Compatibility (L) 4

Power
   ECE 423 Power System Analysis & Lab 3

Integrated Circuits / VLSI
   ECE 402 Applications of Analog Integrated Circuits (L) 4
   ECE 404 Radio Frequency Electronic Circuits (L) 4
   ECE 410 VLSI Design (L) 4
   ECE 411 Electronic Design Automation (L) 4
   ECE 412 Intro to Mixed-Signal Integrated Circuits (L) 4

Solid-State Electronics / Electro-optics
   ECE 474 Principles of Electronic Devices 3
   ECE 476 Electro-Optics (L) 4
   ECE 477 Microelectronic Fabrication (L) 3

Communications / Signal Processing
   ECE 442 Introduction to Communication Networks 3
   ECE 457 Communication Systems 3
   ECE 466 Digital Signal Processing and Filter Design 3

Control / Robotics
   ECE 415 Computer Aided Manufacturing (L) 3
   ECE 416 Digital Control (L) 3

Biomedical Engineering
   ECE 445 Biomedical Instrumentation (L) 3
   ECE 446 Biomedical Signal Processing 3
   ECE 447 Intro to Biomedical Imaging 3
   ECE 448 Modeling & Analys of Bioelectrical Systems 3

Experiential Education Substitution
Students may use registered “out of classroom” experiences to waive one 400-level requirement outside of the major elective requirement. This is a combination of 3 or more experiences documented by pre-approved EGR/ECE credits (EGR 393, ECE 490/499).
The department offers a concentration for students who plan to pursue graduate work in biomedical areas or seek employment in selected medical-related areas. The concentration is available to, but not required of, any student enrolled in the Bachelor of Science degree program in Electrical Engineering. Courses completed to satisfy requirement 3. above may also be used to satisfy the requirements of the concentration. The concentration will be noted on the student’s transcript.

**Biomedical Engineering Concentration: (15)**

To earn a Bachelor of Science degree in Electrical Engineering with a biomedical engineering concentration, students must complete requirements 1., 2., and 3. above and the following. Completion of courses in this concentration may also satisfy Major and Elective course requirements. Check with the academic adviser for guidance.

1. **Complete 6 credits from the following:** (6)
   - ANTR 350 Human Gross Anatomy & Structural Biology 3
   - BS 111 Cells and Molecules 3
   - PSL 250 Introductory Physiology 4
   - PSL 431 Human Physiology I 3
   - PSL 432 Human Physiology II 3

2. **Complete 6 credits from the following:** (6)
   - ECE 445 Biomedical Instrumentation 3
   - ECE 446 Biomedical Signal Processing 3
   - ECE 447 Intro to Biomedical Imaging 3
   - ECE 448 Modeling & Analys of Bioelectrical Systems 3

3. **Complete at least 3 credits from 1) the list below or 2) any 400-level course listed above but not otherwise counted toward the concentration, or 3) other approved course such as ECE 490 or ECE 491 with biomedical engineering content. (3)**
   - ME 494 Biofluid Mechanics and Heat Transfer 3
   - ME 495 Tissue Mechanics 3
   - MSE 425 Biomaterials and Biocompatibility 3

**Other Electives (Variable)**

**Total Credits Required for Degree** 128

The requirements listed above apply to students admitted to the major of Electrical Engineering beginning Fall, 2008. The Department of Electrical and Computer Engineering (ECE) constantly reviews program requirements and reserves the right to make changes as necessary. Students are encouraged to consult with their advisor to obtain assistance in planning an appropriate schedule. Students who have questions about Computer Engineering should contact the Electrical and Computer Engineering Department Advising Office, 2212 Engineering Building, phone (517) 355-5242.

Last revised May 2010
## Electrical Engineering

### Sample Program

#### Freshman Year

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<th>Fall</th>
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<th>Spring</th>
<th>Credits</th>
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<td>WRA 1XX or IAH 20X</td>
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<td>Bioscience (AT)</td>
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<td>EGR 100</td>
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<td>PHY 183</td>
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<td>ECE 101 or Elective</td>
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#### Sophomore Year

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<td>ME 201 / CE 221</td>
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#### Junior Year

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<tr>
<td>ISS 3XX</td>
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<td>IAH 2XX</td>
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#### Senior Year

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<tr>
<td>Major Elective</td>
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<td>Major Elective</td>
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<td>Total</td>
<td>10/16</td>
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</table>

### Program Objectives

The bachelor's degree in electrical/computer engineering provides its graduates with a solid foundation on which they can build successful and sustainable careers in the ever-changing global work environment. The program prepares its graduates for a variety of career paths including engineering positions directly after program completion, entry to engineering graduate school, and entry to other professional graduate-level schools, and eventual leadership in technical, organizational, and entrepreneurial arenas.

Specifically, the electrical/computer engineering program prepares its graduates to become successful in:

- maintaining and increasing their technical and/or broad expertise through lifelong learning;
- using/applying their continual improving expertise in the practice of electrical/computer engineering or a related career; and
- sharing their expertise to the benefit of the larger community.
Materials Science and Engineering
Accredited by the Engineering Accreditation Commission of ABET,
111 Market Place, Suite 1050, Baltimore, MD 21204-4012 - telephone (410) 347-7700.

1. University Requirements: (23-24)
   Writing, Rhetoric and American Cultures (WRA) 4
   Integrative Studies in Humanities (IAH) 8
   Integrative Studies in Social Sciences (ISS) 8
   Bioscience (one of the following):
     BS 110, BS 111, ENT 205, MMG 201, MMG 301, PLB 105, PSL 250, ZOL 141 3-4

2. College Requirements: (30)
   CEM 151 General and Descriptive Chemistry 4
   EGR 100 Introduction to Engineering Design 2
   EGR 102 Introduction to Engineering Modeling 2
   MTH 132 Calculus I 3
   MTH 133 Calculus II 4
   MTH 234 Multivariable Calculus 4
   MTH 235 Differential Equations 3
   PHY 183 Physics for Scientists & Engineers I 4
   PHY 184 Physics for Scientists & Engineers II 4

3. Major Requirements: (44)
   A. Complete all of the following:
      CE 221 Statics 3
      CEM 152 Principles of Chemistry 3
      CEM 161 Chemistry Laboratory I 1
      *ECE 345 Electronic Instrumentation and Systems 3
      ME 222 Mechanics of Deformable Solids 4
      MSE 250 Materials Science and Engineering 3
      MSE 310 Phase Equilibria in Materials 3
      MSE 320 Mechanical Properties of Materials 3
      MSE 331 Materials Characterization Methods I 1
      MSE 350 Electronic Structure & Properties of Materials 3
      MSE 360 Fundamentals of Microstructural Design 3
      MSE 370 Physical Processing of Materials 3
      MSE 381 Materials Characterization Methods II 2
      MSE 466 Design and Failure Analysis (W) 3
      MSE 477 Manufacturing Processes 3
      STT 351 Probability and Statistics for Engineering 3
   
   B. Select two of the following courses: (6)
      MSE 454 Ceramic and Refractory Materials 3
      MSE 465 Design and Application of Engineering Materials 3
      MSE 476 Phys Metallurgy of Ferrous & Alum Alloys 3

   C. Complete at least 5 credits from 400-level courses within the College of Engineering: (5)

   D. Technical Electives: (7)
      Complete at least 7 credits in courses selected from a list of approved technical electives available from the Department of Chemical Engineering and Materials Science.

*ECE 302 and ECE 303 may be substituted for ECE 345.

Concentrations
Students may elect to complete a more focused set of courses to enhance their ability to function at the interface with another scientific, engineering, or business discipline. Concentrations are available to, but not required of, any student enrolled in the Bachelor of Science degree in Materials Science and Engineering. Completing the Bachelor of Science degree in Materials Science and Engineering with a concentration may require more than 128 credits. The concentration will be noted on the student's transcript.

Biomedical Materials Engineering Concentration: (25)
To gain interdisciplinary skills in human biology and earn a Bachelor of Science degree in Materials Science and Engineering with a biomedical materials engineering concentration, students must complete requirement 3. a. above and the following:

1. Complete all of the following: (16)
   ANTR 350 Human Gross Anatomy & Structural Biology 3
   CEM 351 Organic Chemistry I 3
   ME 495 Tissue Mechanics 3
   MSE 425 Biomaterials and Biocompatibility 3
   ZOL 341 Fundamental Genetics 4

2. Complete one of the following courses: (3)
   MSE 454 Ceramics and Refractory Materials 3
   MSE 465 Design and Application of Engineering Materials 3
   MSE 476 Phys Metallurgy of Ferrous & Alum Alloys 3

3. Technical Electives: (6)
   An approved list of Technical Electives is available from the adviser.

Manufacturing Engineering Concentration: (18): To gain interdisciplinary skills with business and design engineers for manufacturing projects and earn a Bachelor of Science degree in Materials Science and Engineering with a manufacturing engineering concentration, students must complete requirement 3. a. above and the following:

1. Complete all of the following: (9)
   ECE 415 Computer Aided Manufacturing 3
   ME 478 Product Development 3
   MSE 465 Design and Application of Engineering Materials 3

2. Complete three of the following courses (9):
   GBL 323 Introduction to Business Law 3
   MSE 426 Introduction to Composite Materials 3
   MSE 454 Ceramics and Refractory Materials 3
   MSE 476 Phys Metallurgy of Ferrous & Alum Alloys 3
   STT 471 Statistics for Quality and Productivity 3

Completion of this concentration fulfills requirement 2 of the admission requirements for the Master of Science degree in Manufacturing and Engineering Management offered by The Eli Broad College of Business.
**Metallurgical Engineering Concentration: (18)**
To enhance the student’s ability to characterize, process, and design with metals in association with mechanical engineers and earn a Bachelor of Science degree in Materials Science and Engineering with a metallurgical engineering concentration, students must complete requirement 3. a. above and the following:

1. **Complete all of the following: (12)**
   - ME 423  Intermed Mechanics of Deformable Solids  3
   - ME 475  Computer Aided Design of Structures  3
   - MSE 465  Design and Application of Egr. Materials  3
   - MSE 476  Phys Metallurgy of Ferrous and Alum Alloys  3

2. **Complete one of the following courses (3):**
   - MSE 426  Introduction to Composite Materials  3
   - STT 471  Statistics for Quality and Productivity  3

3. **Complete one of the following courses (3):**
   - ME 425  Experimental Mechanics  3
   - MSE 451  Microscopic & Diffraction Anlys of Matls  3

**Polymeric Engineering Concentration (18):**
To gain interdisciplinary skills to facilitate interactions with chemical engineers and earn a Bachelor of Science degree in Materials Science and Engineering with a polymeric engineering concentration, students must complete requirement 3. a. above and the following:

1. **Complete all of the following:**
   - CEM 351  Organic Chemistry I  3
   - CHE 311  Fluid Flow and Heat Transfer  3
   - CHE 472  Composite Materials Processing  3
   - CHE 473  Chem Engr Prncpls in Polymrs & Matls Sys  3
   - MSE 426  Introduction to Composite Materials  3
   - STT 471  Statistics for Quality and Productivity  3

**Other Electives (Variable)**

**Total Credits Required for Degree**  128

The requirements listed above apply to students admitted to the major of Materials Science and Engineering in the Department of Chemical Engineering and Materials Science (CHEMS) beginning Fall, 2008. The Department of Chemical Engineering and Materials Science constantly reviews program requirements and reserves the right to make changes as necessary. Consequently, each student is strongly encouraged to consult with his/her adviser to obtain assistance in planning an appropriate schedule of courses. Students who have questions about Materials Science and Engineering should contact the Engineering Undergraduate Studies Advising Office, 1415 Engineering Building, phone (517) 355-6616, extension 1.

Some courses may have prerequisites, which are not otherwise required in the program. Students should check course descriptions to ensure they are aware of prerequisites.

Last Revised May 2010
# Materials Science and Engineering

## Sample Program

### Freshman Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
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<tbody>
<tr>
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<td>CEM 152</td>
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<td>EGR 102</td>
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<td>MTH 133</td>
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<td>MTH 132</td>
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### Sophomore Year

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<tbody>
<tr>
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<td>ISS 3XX</td>
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<td>ME 222</td>
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### Junior Year

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### Senior Year

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<td>MSE 466</td>
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## Materials Science and Engineering Program Educational Objectives

Approved to replace the document adopted on 5/11/05

The MSE program prepares students to apply their understanding of the processing, application, and sustainable use of engineering materials essential to the realization of new ideas coming from engineers, scientists, enterprises, and society. Our overarching objectives are to equip graduates with the confidence that comes from professionalism, and provide them with the tools needed to contribute meaningfully within any of the diverse professional career paths they may choose. Since the discipline creates bridges between science and engineering, MSE majors must communicate effectively with people in many different specialties, and work effectively in multi-disciplinary teams. MSE graduates must be aware of the economic, social, and environmental implications entailed in the processing and use of materials, and must have a solid grounding in professional engineering ethics.

The faculty provide a rigorous academic environment so that graduates will have mastered the analytical and technical skills needed to successfully compete as professionals, entrepreneurs, or as postgraduate scholars.

### The MSE Program prepares our graduates to:

I. Achieve success in Materials Science & Engineering or another chosen career;
II. Advance to leadership roles within their profession and community;
III. Contribute effectively to their disciplines, economies and society;
IV. Compete with confidence for opportunities for postgraduate education;
V. Enjoy the benefits of a lifetime of learning and professional development.
### Mechanical Engineering

Accredited by the Engineering Accreditation Commission of ABET,
111 Market Place, Suite 1050, Baltimore, MD 21202-4012 - telephone (410) 347-7700.

<table>
<thead>
<tr>
<th>Requirement</th>
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<tr>
<td>1. University Requirements: (23-24)</td>
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<td>Writing, Rhetoric and American Cultures (WRA)</td>
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<td>Integrative Studies in Humanities (IAH)</td>
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<td>Integrative Studies in Social Sciences (ISS)</td>
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<td>Bioscience (one of the following):</td>
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<td>MMG 301, PLB 105, PSL 250, ZOL 141</td>
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<tr>
<td>2. College Requirements: (30)</td>
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<td>CEM 141 General Chemistry</td>
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<td>EGR 100 Introduction to Engineering Design</td>
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<td>EGR 102 Introduction to Engineering Modeling</td>
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<td>MTH 132 Calculus I</td>
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<td>ECE 345 Electronic Instrumentation and Systems</td>
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<td>MSE 250 Materials Science and Engineering</td>
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<tr>
<td>ME 332 Fluid Mechanics</td>
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<tr>
<td>ME 361 Dynamics</td>
<td>3</td>
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<tr>
<td>ME 371 Mechanical Design I</td>
<td>3</td>
</tr>
<tr>
<td>ME 391 Mechanical Engineering Analysis</td>
<td>3</td>
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<tr>
<td>ME 410 Heat Transfer</td>
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<tr>
<td>ME 412 Heat Transfer Laboratory</td>
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<tr>
<td>ME 451 Control Systems</td>
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<td>ME 461 Mechanical Vibrations</td>
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<tr>
<td>ME 471 Mechanical Design II</td>
<td>3</td>
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<td>ME 481 Mechanical Engineering Design Projects</td>
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<tr>
<td>C. Senior Electives: (9)</td>
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<tr>
<td>Complete a minimum of nine credits from the</td>
<td></td>
</tr>
<tr>
<td>following:</td>
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<tr>
<td>ME 416 Computer Asstd Design of Thermal Sys</td>
<td>3</td>
</tr>
<tr>
<td>ME 417 Design of Alternative Energy Systems</td>
<td>3</td>
</tr>
<tr>
<td>ME 422 Introduction to Combustion</td>
<td>3</td>
</tr>
<tr>
<td>ME 423 Intermed Mech of Deformable Solids</td>
<td>3</td>
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<tr>
<td>ME 425 Experimental Mechanics</td>
<td>3</td>
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<tr>
<td>ME 426 Introduction to Composite Materials</td>
<td>3</td>
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<tr>
<td>ME 432 Intermediate Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>ME 440 Aerospace Engineering Fundamentals</td>
<td>3</td>
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<tr>
<td>ME 442 Turbomachinery</td>
<td>3</td>
</tr>
<tr>
<td>ME 444 Automotive Engines</td>
<td>3</td>
</tr>
<tr>
<td>ME 445 Automotive Powertrain Design</td>
<td>3</td>
</tr>
<tr>
<td>ME 456 Mechatronic System Design</td>
<td>3</td>
</tr>
<tr>
<td>ME 457 Mechatronic Sys Modeling &amp; Simulation</td>
<td>3</td>
</tr>
<tr>
<td>ME 464 Intermediate Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>ME 465 Computer Aided Optimal Design</td>
<td>3</td>
</tr>
<tr>
<td>ME 475 Computer Aided Design of Structures</td>
<td>3</td>
</tr>
<tr>
<td>ME 477 Manufacturing Processes</td>
<td>3</td>
</tr>
<tr>
<td>ME 478 Product Development</td>
<td>3</td>
</tr>
<tr>
<td>ME 486 Int’l Networked Teams/ Engr Design</td>
<td>3</td>
</tr>
<tr>
<td>ME 490 Independent Study in Mechanical Engr</td>
<td>1-3</td>
</tr>
<tr>
<td>ME 491 Selected Topics in Mechanical Engr</td>
<td>1-4</td>
</tr>
<tr>
<td>ME 494 Biofluid Mechanics and Heat Transfer</td>
<td>3</td>
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<tr>
<td>ME 495 Tissue Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>ME 497 Biomechanical Design</td>
<td>3</td>
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<tr>
<td>D. Design-Intensive courses. Complete a minimum</td>
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</tr>
<tr>
<td>of three additional credits from: (3)</td>
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<tr>
<td>ME 416 Computer Asstd Design of Thermal Sys</td>
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</tr>
<tr>
<td>ME 417 Design of Alternative Energy Systems</td>
<td>3</td>
</tr>
<tr>
<td>ME 442 Turbomachinery</td>
<td>3</td>
</tr>
<tr>
<td>ME 445 Automotive Powertrain Design</td>
<td>3</td>
</tr>
<tr>
<td>ME 456 Mechatronic System Design</td>
<td>3</td>
</tr>
<tr>
<td>ME 465 Computer Aided Optimal Design</td>
<td>3</td>
</tr>
<tr>
<td>ME 475 Computer Aided Design of Structures</td>
<td>3</td>
</tr>
</tbody>
</table>
Concentrations:
The Department offers concentrations in engineering mechanics, and manufacturing engineering to students wishing an area of specialization in their degree. The concentrations are available to, but not required of, any student enrolled in the Bachelor of Science degree program in mechanical engineering. NOTE: Completing the Bachelor of Science degree in mechanical engineering with a concentration may require more than 128 credits. Upon completion of the required courses for one of these concentrations, certification will appear on the student’s official transcript.

Biomechanical Engineering Concentration (16)
To earn a Bachelor of Science degree in Mechanical Engineering with a biomechanical engineering concentration, students must complete requirements 1., 2., 3.a., 3.b., and 3.d. above and the following:

Both of the following courses (7):
BS 111 Cells and Molecules 3
PSL 250 Introductory Physiology 4

Select nine credits from the following courses (9):
ME 494 Biofluid Mechanics and Heat Transfer 3
ME 495 Tissue Mechanics 3
ME 497 Biomechanical Design 3
ME 490 Ind Study in Mechanical Engr 1-4
ME 491 Selected Topics in Mechanical Engr 1-4
MSE 425 Biomaterials and Biocompatibility 3

Manufacturing Engineering Concentration (13)
To earn a Bachelor of Science degree in Mechanical Engineering with a manufacturing engineering concentration, students must complete requirements 1., 2., 3.a., 3.b., and 3.d. above and the following:

All of the following courses (10):
EC 210 Economics Principles Using Calculus 3
ME 372 Machine Tool Laboratory 1
ME 477 Manufacturing Processes 3
ME 478 Product Development 3

Select one of the following courses (3):
CHE 472 Composite Materials Processing 3
ECE 415 Computer Aided Manufacturing 3
MSE 426 Introduction to Composite Materials 3

Engineering Mechanics Concentration (12)
To earn a Bachelor of Science degree in Mechanical Engineering with an engineering mechanics concentration, students must complete requirements 1., 2., and 3.a., and 3.b. above and the following:

ME 423 Intermed Mechanics of Deform Solids 3
ME 425 Experimental Mechanics 3
ME 464 Intermediate Dynamics 3
ME 475 Computer Aided Design of Structures 3

Global Engineering (12)
To earn a Bachelor of Science degree in Mechanical Engineering with a global engineering concentration, students must complete requirements 1., 2., 3.a., and 3.b. above and 12 credits of approved mechanical engineering courses from a MSU co-sponsored Study Abroad institution. At least 3 credits must include a team design project.

The requirements listed on opposite page apply to students admitted to the major of Mechanical Engineering in the Department of Mechanical Engineering beginning Fall 2008. The Department of Mechanical Engineering (ME) constantly reviews program requirements and reserves the right to make changes as necessary. Consequently, each student is strongly encouraged to consult with his/her advisor to obtain assistance in planning an appropriate schedule of courses. Students who have questions about Mechanical Engineering should contact the Mechanical Engineering Department Advising Office, 2560 Engineering Building, phone (517) 355-3338.

Some courses may have prerequisites, which are not otherwise required in the program. Students should check course descriptions to ensure they are aware of prerequisites.
## Mechanical Engineering Sample Program

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Sophomore Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall</strong></td>
<td><strong>Spring</strong></td>
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<tr>
<td>Bioscience</td>
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<td>3/4</td>
<td>1</td>
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<tr>
<td>CEM 141</td>
<td>EGR 102</td>
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<td>ISS 2XX</td>
<td>PHY 183</td>
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<td>WRA 1XX</td>
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<table>
<thead>
<tr>
<th>Junior Year</th>
<th>Senior Year</th>
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<tbody>
<tr>
<td><strong>Fall</strong></td>
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<td>Elective</td>
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<td>ME 391</td>
<td>ME 332</td>
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<tr>
<td>STT 351</td>
<td>ME 371</td>
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<td><strong>Total</strong></td>
</tr>
<tr>
<td>16</td>
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</tbody>
</table>

### Program Educational Objectives for the Undergraduate Program in Mechanical Engineering

Department of Mechanical Engineering
Michigan State University
(Approved by the Department Faculty February 17, 2005)

**Objective 1:** Our graduates will be competent engineers practicing in a diverse range of activities.

**Objective 2:** Our graduates will use their mechanical engineering education as an impetus for personal & professional growth.

**Objective 3:** Our graduates will have achieved a noteworthy level of workplace responsibility through understanding their environment and capabilities, including the importance of knowledge management.

**Objective 4:** Our graduates will be independent thinkers who take ownership in identifying problems and determining effective solution strategies in a timely manner.
Spartan Engineering

ANSOSYDUTSCIENCE
NODEEOISJOBROASH
LACITANERMBEAIIISC
TSTSVAATNATRCDTLAR
AECEELLOCALALDALDA
RORIRRAPSCIENE
ETAESPNSCRSRUMAS
SMETYISOIBELBDRME
ICOTHAHENTUEMEAR
DNHYAPIPASYANRCNC
EAGERPMPMNTEGIECO
NARIMLTECHNOLOGYL
TLERSISHECROORENL
IRETNECOMPUTERDTE
ALHCTDDADVISORAHG
LACIRTCLELIALGRIE
NSHELESEEIMONICAR

Advisor Amanda Applied Biosystems
Build Calculus Carmellia Center
Chemical Colleen College Computer
Cornerstone Create Cynthia Dan
Design Diversity Education Electrical
Engineer Gaile Internship Job
Materials Math Mechanical Monica
Physics Programs Research Residential
Science Sean Spartan Study
Technology Teresa