

***Engineering Mechanics
and
Engineering Mechanics with
Astronautics Option***

***A Guide for
Undergraduate Majors***

July 2009

This guide applies to students entering the program after July 2009. Students admitted prior to July 2009 should continue to follow the Undergraduate Student Guide in effect when they entered the program. They may petition the department to select features of the new curriculum.

administered by the

Department of Engineering Physics

153 Engineering Research Building, 1500 Engineering Drive, Madison, WI 53706-1609
Phone: (608) 263-1646, Fax: (608) 263-7451, Internet: www.engr.wisc.edu/ep/

Table of Contents

Introduction	1
Bachelor of Science in Engineering Mechanics	1
Astronautics Option	2
Career Opportunities	2
Objectives and Expected Outcomes	3
Some Friendly Advice	4
Curriculum Requirements	4
Engineering Mechanics	5
Astronautics Option in Engineering Mechanics	6
Electives Requirements	7
Undergraduate Honors in Research Program.....	8
Advising	9
DARS Reports	9
Tips to Help You	
Independent Study - EMA 599	9
Pass / Fail Privilege.....	9
Co-op/Internship Program	9
Statistics	9
Hourly Work	10
Letters of Recommendation	10
Professional Registration	10
Special Graduation Requirements	10
Credit for Previous College Work	10
Scholarships and Financial Aid	11
Graduate Study	
M.S. and Ph.D. in Engineering Mechanics	11
Senior-Grad Status	11
Graduate Record Examination	11
Special Programs	
Engineering Honors in the Liberal Arts.....	11
Certificate in Technical Communications	11
Certificate in Japanese Studies for Engineering Majors	12
Letters & Science Second Major for Engineering Students	12
Additional Information	
Department Colloquia	12
AIAA Student Chapter	12
Engineering Expo	12
Faculty-Student Committee (FSC)	13
Duplicating	13
Personal Property	13
Departmental Office Staff	14
Reactor Lab Staff.....	14
Engineering Mechanics Faculty	14
Frequently Asked Questions	15

Introduction

The **Engineering Mechanics (EM)** Program is administered by the **Department of Engineering Physics**. The Department Office is room 153, Engineering Research Building (ERB). The department also administers the **Nuclear Engineering (NE)** and the **Engineering Physics (EP)** undergraduate programs.

This guide is intended to provide **Engineering Mechanics (EM)** undergraduate students with information that will facilitate their studies at the University of Wisconsin-Madison. In addition to this guide, you should consult the **Undergraduate Catalog** (<http://www.wisc.edu/pubs/ug/>) for regulations and course descriptions in engineering.

The **Engineering Physics** web site is at <http://www.engr.wisc.edu/ep/>. From there you can follow links to specific sections for **EM** students. The **College of Engineering (COE)** web site (<http://www.engr.wisc.edu>) also provides information for engineering students.

We welcome you to the **Engineering Mechanics** Program, and wish you a successful undergraduate experience!

Bachelor of Science in Engineering Mechanics

The undergraduate program in **Engineering Mechanics** provides its graduates with the broad scientific background necessary for exploring fundamental design and research questions in many fields of engineering. Graduates interact effectively with chemists, physicists, mathematicians and engineers on interdisciplinary projects and programs in a diverse variety of industrial and government organizations. Their tasks may include developing or modifying analytical or experimental models; or solving problems in the newly emerging areas of engineering for which standard methods, formulas or materials have not yet been developed.

The **Engineering Mechanics** Program contains a relatively large number of elective credits available during the latter part of the curriculum giving students excellent flexibility for pursuing their own personal interests and professional goals. With the help of an advisor, the student participates continuously and effectively in planning his/her educational program. Upon completion of the common core of courses taken during the Freshman and Sophomore years, a student is well prepared to emphasize one of the many areas of special interest within the Department or to pursue the Astronautics degree option. With the variety of elective courses available during the remaining part of the **Engineering Mechanics** Program, the student is given maximum flexibility in pursuing an area of special interest. These include:

- Structural Mechanics
- Dynamics and Vibrations
- Applied Mathematics and Numerical Methods
- Experimental Mechanics and Materials

Remember, it is up to you and your advisor to put together a coherent program which satisfies all the requirements. Your advisor is there to help you, so seek out his or her assistance.

The **Engineering Mechanics** Program provides an excellent preparation for graduate study in a variety of engineering and scientific disciplines. The opportunity is also available to use the liberal studies and free electives of the curriculum as preparation for entrance into law, medical or business schools after graduation.

Astronautics Option

Aerospace engineering is an extremely broad area of engineering encompassing the research and development frontiers of nearly all areas of engineering and science. Aerospace engineering is frequently discussed in terms of its two major areas, namely aeronautics and astronautics. These two areas are not mutually exclusive and include many common fundamental disciplines, such as structures, modern materials, and flight mechanics.

The major focus of our program is on astronautics, which relates to rocket, satellite and spacecraft design, while aeronautics, which deals with aircraft design, has a more modest emphasis. However, graduates of our program are widely employed by aircraft companies because of the commonalities in these disciplines. The Astronautics option provides an excellent background for a wide variety of interesting and exciting jobs in industry and government laboratories. It also serves as excellent preparation for graduate study in a wide range of aerospace disciplines and other high-technology areas.

The Astronautics Program provides students with opportunities for research, development and design careers in a wide variety of aerospace disciplines. In the area of designing aerospace structures, students learn contemporary methods of analytical and experimental stress analysis, structural dynamics, vibrations and computer analysis. In the latter case, a knowledge of finite element methods is currently in great demand in the aerospace industry. Students have opportunities to study fatigue, fracture mechanics and composite materials, all areas of importance and concern to aerospace companies.

In the area of spacecraft dynamics, all students study orbital mechanics, transfer orbits, lunar and interplanetary trajectories, rocket dynamics, vibrations, gyroscopic instruments, control systems, aerodynamics and dual spin satellites. In addition, students have the opportunity to study space propulsion, flight mechanics and robotics, all at the advanced undergraduate level. Astronautics students often extend their education by co-opting with aerospace companies and NASA.

The capstone design sequence scheduled for the senior year provides students with excellent opportunities to apply knowledge gained in various courses to space related design projects.

Students completing the Astronautics option receive the B.S. in Engineering Mechanics, with the Astronautics option noted on the student's transcript. The Astronautics option can be selected by filling out an **Option Declaration Form** available in the **Engineering Physics Department** office (153 ERB) or from the **EP Department** Student Services Office (144 ERB).

Career Opportunities

Graduates of the **Engineering Mechanics** Program are sought by most industries and government agencies. Typical examples of project areas requiring engineers with a broad science and engineering background and with an emphasis in applied mechanics are outlined below:

Development of improved experimental, analytical and engineering methods as well as new materials for automobiles, air/spacecraft, submarines, high-speed rail systems, and other moving vehicles for improved safety, strength, and reliability.

Design of new types of structures projected for future needs, such as advanced energy systems, cryogenic structures, space stations, undersea structures and earthquake resistant installations.

Dynamic and vibrational design of rotating machinery such as aircraft engines, high-speed gas and steam turbines, spinning disks for digital information storage, aircraft and automotive tire applications, and high-speed rotating drums and pumps.

Development of innovative experimental methods for studying machines, structural components and materials where new and unusual design conditions are encountered, such as very high or low temperatures, vibrational and repetitive loads, impact situations, moving loads, large magnetic or electrical fields, and biomedical environments.

Development of new theories, methods of analysis and computational techniques for treating unusual advanced design problems in engineering which may require higher levels of mathematics and computer training.

Research, development and testing of new materials such as metals, ceramics, composites, and plastics, to meet the changing requirements of the future that will be encountered in designing advanced energy systems, extremely high speed machinery, nonmetallic substitutes, micromachines and biomedical apparatus. Advanced engineering in the research and development programs of major industries such as the automotive, aerospace, computer, construction, farm equipment, home appliances, industrial machinery, nuclear, oceanographic, petroleum, tire and rubber, plastics and paper.

Objectives and Expected Outcomes

The objectives of the **Engineering Mechanics** Program are to:

- a) Educate students in the fundamental subjects necessary for a career in mechanics and/or astronautics, and prepare students for advanced education in these and related fields.
- b) Educate students in the basics of instrumentation, design of laboratory techniques, measurement, and data acquisition, interpretation and analysis.
- c) Educate students in the methodology of design.
- d) Provide and facilitate teamwork and multi-disciplinary experiences throughout the curriculum.
- e) Help students develop effective oral and written communication skills.
- f) Expose students to environmental, ethical and contemporary issues.

Engineering Mechanics Program graduates are expected to have...

1. an ability to identify, formulate, and solve engineering problems. This includes:
 - a. an ability to apply knowledge of basic mathematics, science and engineering
 - b. an ability to use advanced mathematical and computational techniques to analyze, model, and design physical systems consisting of solid and fluid components under steady state and transient conditions.
 - c. an ability to design a system, component or process to meet desired needs.
 - d. an ability to use the techniques, skills and modern engineering tools necessary for engineering practice.
2. an ability to design and conduct experiments, as well as to analyze and interpret data.
3. an ability to function on multi-disciplinary teams.
4. knowledge of professional and ethical standards.
5. an ability to communicate effectively.
6. the broad education necessary to understand the impact of engineering solutions in a global and societal context.
7. a recognition of the need for, and ability to engage in life-long learning.
8. a knowledge of contemporary issues.

Some Friendly Advice

An alumnus who currently has the title of Manager at an important government facility expressed a view supported by others:

Engineers must be well rounded; a tremendous amount is expected of us by employers and the public. Communication skills, interpersonal relationships, team building, and positive attitude are essential for success.

Tolerance for others' opinions (regardless of how misguided we may feel they are) is also extremely important.

Transcending this there must be an inner commitment to excellence. I don't think this can be taught, but everyone must be challenged to excellence.

Mediocrity should be sneered at, disdained - - - and never accepted. The faculty has a real challenge to motivate young engineers to not accept anything "half-way," anything less than excellence.

Curriculum Requirements

The curriculum applies to students who entered the program after May 2001. Students admitted prior to May 2001 may petition the department to select features of the new curriculum. For curriculum requirements prior to May 2001, see earlier versions of this document.

Engineering Mechanics

(for students entering the program after May 2001)

Suggested Sequence

Fall Semester	Cr	Spring Semester	Cr
Freshman Year			
Chem 109 General & Anal Chemistry I ¹	5	EMA 201 Statics ³	3
Math 221 Calculus & Analytic Geom.	5	Math 222 Calculus & Analytic Geom.	5
Communications "A" Elective	2	Stat 224 Statistics for Engineers	3
InterEgr (EPD) 160 Intro to Engineering ²	<u>3</u>	ME 231 Graphics	2
	15	Liberal Studies Electives	<u>3</u>
			16
Sophomore Year			
Math 234 Calculus-Fn. of Several Variables	3	Math 319 Differential Equations	3
Phys 202 General Physics	5	Physics 241 or Phys. 205 Modern Phys.	3
EMA 202 Dynamics	3	ME 361 Engineering Thermodynamics	3
NE 271 Engr. Prob. Solving I ⁴	3	EMA 303 Mechanics of Materials	3
EPD 275 or CA 105 Public Speaking	<u>2</u>	EMA 307 Mechanics of Materials Lab	1
	16	Liberal Studies Electives	<u>3</u>
			16
Junior Year			
EMA 506 Adv. Strength of Materials	3	EMA 405 Practicum in Finite Elements	3
EMA 542 Adv. Dynamics		Experimental Mechanics Course ⁶	3
or EMA 545 Vibrations ⁵	3	ME 363 or CEE 310 Fluid Mechanics	3
Math 340 Linear Algebra	3	Computing Elective	3
MS&E 350 Intro. to Materials Science	3	Technical Electives	<u>3</u>
EPD 397 Technical Writing	3		15
Liberal Studies Electives	<u>3</u>		
	18		
Senior Year			
EMA 469 Design Prob. in Engineering	3	EMA 569 Senior Design Project	3
EMA 521 Aerodynamics ⁷	3	EMA Electives	6
EMA Electives	3	ME 364 Heat Transfer	3
ECE 376 Electrical Circuits	3	Liberal Studies Elective	<u>3</u>
Liberal Studies Electives	<u>4</u>		15
	16		

Total Credits Required for Graduation: 127

1. Students should take Chem 109, 5 cr; students with inadequate preparation in high school chemistry may substitute Chem 103 and 104, for a total of 9 credits.
2. Students who were not able to take InterEgr (EPD)160 as freshmen may, with the approval of their advisor, substitute 3 credits of electives from courses offered in the College of Engineering or in the Departments of Chemistry, Computer Science, Mathematics, and Physics.
3. Students may substitute Phys 201, 5 cr., for EMA 201, 3 cr., with the approval of their advisor.
4. Computer Science 310 is an acceptable substitute for NE 271.
5. Students electing EMA 545 instead of EMA 542 should note that EMA 545 is offered in the spring semester only.
6. EMA 611 or EMA 540 or EMA 570 or EMA 522.
7. ME 563, Advanced Fluid Mechanics, may be substituted for EMA 521.

Astronautics Option in Engineering Mechanics

(for students entering the program after May 2001)

Suggested Sequence

Fall Semester	Cr	Spring Semester	Cr
Freshman Year			
Chem 109 General & Anal Chemistry I ¹	5	EMA 201 Statics ³	3
Math 221 Calculus & Analytic Geom.	5	Math 222 Calculus & Analytic Geom.	5
Communications "A" Elective	2	Stat 224 Statistics for Engineers	3
InterEgr (EPD) 160 Intro. to Engineering ²	<u>3</u>	ME 231 Graphics	2
	15	Liberal Studies Electives	<u>3</u>
			16
Sophomore Year			
Math 234 Calculus-Fn. of Several Variables	3	Math 319 Differential Equations	3
Phys 202 General Physics	5	Physics 241 or Phys. 205 Modern Phys.	3
EMA 202 Dynamics	3	ME 361 Engineering Thermodynamics	3
NE 271 Engr. Prob. Solving I ⁴	3	EMA 303 Mechanics of Materials	3
EPD 275 or CA 105 Public Speaking	<u>2</u>	EMA 307 Mechanics of Materials Lab	1
	16	Liberal Studies Electives	<u>3</u>
			16
Junior Year			
EMA 506 Adv. Strength of Materials	3	EMA 545 Vibrations	3
EMA 405 Practicum in Finite Elements	3	EMA 550 Astrodynamics	3
ME 363 or CEE 310 Fluid Mechanics	3	Experimental Mechanics Course ⁵	3
Math 340 Linear Algebra	3	ME 364 Heat Transfer	3
EPD 397 Technical Writing	3	Computing Elective	<u>3</u>
Liberal Studies Electives	<u>3</u>		15
	18		
Senior Year			
EMA 469 Design Prob. in Engineering	3	EMA 569 Senior Design Project	3
EMA 521 Aerodynamics ⁶	3	EMA 642 Satellite Dynamics	3
EMA 542 Adv. Dynamics	3	ECE 332 or ME 446 Control Systems ⁷	3
ECE 376 Electrical Circuits	3	Technical Electives	3
Liberal Studies Electives	<u>4</u>	Liberal Studies Electives	<u>3</u>
	16		15

Total Credits Required for Graduation: 127

1. Students should take Chem 109, 5 cr.; students with inadequate preparation in high school chemistry may substitute Chem 103 and 104, for a total of 9 credits.
2. Students who were not able to take InterEgr (EPD)160 as freshmen may, with the approval of their advisor, substitute 3 credits of electives from courses offered in the College of Engineering or in the Departments of Chemistry, Computer Science, Mathematics, and Physics.
3. Students may substitute Phys 201, 5 cr., for EMA 201, 3 cr., with the approval of their advisor.
4. Computer Science 310 is an acceptable substitute for NE 271.
5. EMA 611 or EMA 540 or EMA 570 or EMA 522.
6. ME 563, Advanced Fluid Mechanics, may be substituted for EMA 521.
7. The controls courses, ECE 332 and ME 446, have prerequisites not included in the Astronautics curriculum, but our experience is that Math 319 and EMA 545 provide sufficient background for these courses.

Electives Requirements

(For students entering the program after May 2001)

Liberal Electives (16 credits)

Sixteen credits from the College of Engineering, the Institute for Environmental Studies, or the College of Letters and Science that carry H, S, L, or Z *Class Search* (formerly *Timetable*) breadth designators must be taken to fulfill the Liberal Electives Requirements. These credits must fulfill the following sub-requirements:

- I. A minimum of two courses must be from the same department or program. At least one of these two courses must be above the elementary level (i.e. must have I, A, or D level designator), as indicated in Class Search.
- II. A minimum of six credits must be in courses designated as humanities (H, L, or Z), and an additional minimum of three other credits designated as social studies (S or Z). Foreign language credits count as H credits.
- III. At least three credits must be in courses designated as ethnic studies (lower case "e" in Class Search). These credits may help satisfy regulations I or II as well, but may count only once toward the total credits required.

Communication Skills "A" Requirement (2 cr)

Students must take one course from the following list:

EPD 155	Basic Communication.	2 credits
Eng 100	Freshman Composition	3 credits
Comm Arts	100 Introduction to Speech Composition	3 credits
Ag Journ 100	Introduction to Communication	3 credits
ILS 200	Critical Thinking and Expression	3 credits

Many students find it useful to take EPD 155 and InterEgr (EPD) 160 concurrently in the fall semester of their freshmen year.

Communications "B" Elective

This requirement is automatically met by EPD 397, which is a required course. Other Communication "B" courses may be substituted upon approval of the department chair.

Computing Elective (3 cr)

Students need one course from the following list:

CS 367	Introduction to Data Structures	3 credits
CS 412	Introduction to Numerical Methods	3 credits
EP/EMA 471	Engineering Problem Solving II	3 credits
EP/EMA/NE 476	Computational Engineering	3 credits

Technical Electives (3 cr)

Students need 3 credits at an academic level that requires 2 semesters of calculus or 2 semesters of physics as a prerequisite. EMA 001, Cooperative Education Program, may also be used to satisfy this requirement.

Engineering Mechanics Electives

(9 credits in the standard program, none in the astronautics option)

Courses meeting the **Engineering Mechanics** Electives requirement are all EMA courses numbered 500 and above. No more than 3 credits of EMA 599, Independent Study, may be used to meet this requirement.

Undergraduate Honors in Research Program

Expectations for Honors in Research Projects

The research should be such that the student participates in the creation of new knowledge, experiences the excitement of the research process, and makes a contribution so that it would be appropriate to include the student's name on scholarly publications resulting from the research. The research need not be an independent effort by the student, but can be participation in a larger team effort, as long as it meets the criteria above.

Admission Requirements

At least two semesters completed on the Madison campus with a cumulative GPA of at least 3.5.

Admission Process

The student should identify and obtain the concurrence of an appropriate professor to serve as his/her thesis advisor. The student should submit a letter to the **Engineering Physics Department** chair requesting admission, stating the approximate topic of his/her proposed research, and identifying the proposed thesis advisor under whose guidance he/she will be working. The topic should be appropriate to the major. A letter from the proposed thesis advisor supporting the application should be included.

Academic Credit

Students register for credit in Honors in Undergraduate Research (EMA 489). Students may register for 1 to 3 credits per semester. A grade of "P" (Progress) will be assigned each semester until the student completes the senior thesis or drops out of the program, at which time a final grade is assigned. This becomes the grade for all credits taken in EMA 489.

Senior Thesis

A senior thesis worth 3 credits of EMA 489 is required. The senior thesis is a written document reporting on a substantial piece of work. It should be written in the style of a graduate thesis. The thesis advisor determines the grade which the student receives for the thesis. A bound copy of the thesis should be submitted to the **Engineering Physics Department** Office.

Before the end of the last semester of undergraduate studies, the senior thesis should be presented by the student to a committee of three professors in a publicly announced seminar. Interested faculty and students will be invited to attend.

Honors Designation

"Honors in Research" designation will be awarded to graduates who meet the following requirements:

1. Satisfaction of requirements for an undergraduate degree in either Engineering Mechanics or Nuclear Engineering.
2. A cumulative grade-point average of at least 3.3.
3. Completion of a senior honors thesis (3 credits of EMA 489) with a grade of B or better.
4. Completion of a total of at least 8 credits in EMA 489.

Recognition

The designation, "Honors in Research" will be recorded on the student's transcript and diploma.

Advising

The staff in the Engineering General Resources office, Room 1150 Engineering Hall, advise all EGR students. However, EGR students interested in engineering mechanics and/or astronautics are also encouraged to meet with Prof. Wendy Crone (543 ERB, 262-8384, crone@enr.wisc.edu) or Prof. Matt Allen (535 ERB, 890-1619, msallen@enr.wisc.edu).

Once you have been admitted to the EM Program you are assigned an EM advisor. **Students retain the same advisor until graduation, even if they do not progress in class standing at the normal rate.** Before registering, each student must meet with their faculty advisor for assistance in planning courses and meeting degree requirements and objectives. **You must consult with an advisor and turn in your course advising form to the Department office before you register for the following semester. A hold is placed on your ability to register until this form is received.**

DARS Reports

The DARS report is a computer generated record of courses you have taken and where you stand relative to degree requirements. It is an aid to help you and your advisor in tracking your progress towards graduation. This record can be obtained through your MyUW website. You should be aware that the DARS report is **unofficial** and may contain errors. **You should check your DARS report on a regular basis for errors and bring them to the attention of your advisor**, so that a correction can be made. Your record will still be subject to an audit at graduation.

Tips to Help You

Independent Study - EMA 599

Undergraduate students are strongly encouraged to enroll in EMA 599 Independent Study, to gain exposure to research. This will broaden the mental horizons of the student participants, will help those wondering about graduate study to make a decision, and will help those aimed towards graduate study to compare areas of research. Students work on research projects under the guidance of a professor. Together they agree on the work to be done and the number of credits earned (usually 1-3) per semester. Up to 3 credits of EMA 599 may be used as **Engineering Mechanics** electives.

Pass / Fail Privilege

Students in good standing may elect to take up to two liberal studies or free elective courses on a pass/fail basis. See College of Engineering regulations.

Co-op/Internship Program

The Co-op/Internship program is an excellent way to get engineering experience while working in a company, either for a summer or a semester. Many students have found these programs extremely valuable in enhancing their education and are frequently in a favored position to gain employment with the company after graduation. Consult the Engineering Career Services office, M1002 Engineering Centers Building, for further information. Academic credit is earned through EMA 001; up to 3 credits may be used as a technical elective.

Statistics

The curriculum requires Stat 224, but you may want to take a more challenging course, Stat 301, instead; if so, a substitution can be requested from your advisor.

Hourly Work

Working on research with a faculty member in the Department is a very valuable experience for undergraduates. A number of undergraduates are employed by faculty members either under the work-study program or on research grants. Students are encouraged to explore such opportunities by talking to members of the faculty.

Letters of Recommendation

The letters of recommendation you will request as a Senior will have a significant effect on your job opportunities, salary offers, graduate fellowship opportunities, admission to graduate schools, and so on. It is important that the writers of such letters be able to say that they know you well. Therefore, it can be very much worth your effort to ensure that one or two of the instructors you have had, advisors, or faculty employers know you really well. For example, you might do an extra project for an instructor in a course, you might work as a student hourly employee in a laboratory, you might take independent-study courses, or you might volunteer for Engineering Expo or other activities which will favorably call you to the attention of faculty. Obviously, participating in class discussions and asking many intelligent questions is also helpful.

Professional Registration

Most states license professional engineers. Registration as a professional engineer is a requirement for some jobs and generally increases the earning power and responsibility of the licensed individual. The registration process requires exams on Fundamentals of Engineering (FE) and on the principles and practice of engineering. Seniors can usually pass these tests easily and are urged to take them. Information may be found on the bulletin board outside the Department Office or may be obtained from: Department of Regulation and Licensing, Bureau of Business and Design Professions, P.O. Box 8935, Madison WI 53708-1397, phone 608-266-1397, (<http://www.drl.state.wi.us>); NCEES (<http://www.ncees.org/>) has information and study guides for the FE exam. Be aware that the FE exam is given **only in April and October**, and the deadline for filing applications is typically a few months earlier. Therefore, students should begin planning for the exam while they are still juniors.

Special Graduation Requirements

Students should particularly note the requirements for graduation given in 34b, c, and f of the "Official Regulations Regarding Enrollment, Scholarship, and Graduation for Undergraduate in the College of Engineering of University of Wisconsin-Madison." Among other requirements paragraph 34 specifies GPA requirements for the last 60 credits, for courses taken in your major, and for the student's last semester and last two semesters. A copy of the "Official Regulations" can be obtained in the **Engineering Physics Department** office (153 ERB) or in the **COE Dean's Office** (1150 Engineering Hall, or 2630 Engineering Hall).

Credit for Previous College Work

Students who have done college level work elsewhere can usually transfer credits earned at other colleges. See Ms. Bonnie Schmidt (1150 Engineering Hall, 262-2473) to arrange a transfer of credits. In addition, there is the possibility of having prerequisites waived, of having course requirements waived, or of receiving course credit. Generally, prerequisites can be waived by the instructor teaching the course. The Department Chair can waive course requirements, and the department that offers a course can give credit for one of its courses either by examination or on the basis of evidence of equivalent work.

Scholarships and Financial Aid

Most financial assistance is awarded through the Office of Student Financial Aid (333 E. Campus Mall, 262-3060). Some financial assistance is also available from Engineering General Resources (1150 Engineering Hall, 262-2473). The Department has a limited amount of scholarship funds awarded on a merit basis, usually at the beginning of the Fall semester. An application for departmental scholarships is not necessary; all students are automatically considered in the competition for departmental scholarships.

The Wisconsin Space Grant Consortium and the American Institute for Aeronautics and Astronautics award scholarships to EM students; see the AIAA advisor, Prof. Dan Kammer (539 ERB, 262-5724, kammer@engr.wisc.edu), for further information.

Graduate Study

M.S. and Ph.D. in Engineering Mechanics

The Department offers the Master's of Science and Doctor of Philosophy degrees in Engineering Mechanics. Students interested in graduate work in EM at Wisconsin can find more information at the EM Graduate Program website, www.engr.wisc.edu/ep/ema/current/grad/ or from The Academic Policies and Procedures for Graduate Work in Engineering Mechanics available in the Department Office. Additional information about opportunities and financial aid may be obtained from the Department Administrator, Mr. Mark Swandby, 146 ERB or at www.grad.wisc.edu/education/funding/index.html. Information from other graduate schools is available on the bulletin board outside the Department Office, in the library, and at the Graduate School office in Bascom Hall.

Senior-Grad Status

Seniors within six credits of graduation, who otherwise meet the graduate school admission requirements, may apply for concurrent enrollment as an undergraduate and as a graduate student and get a head start on a graduate degree. See the Graduate School in Bascom Hall for further information.

Graduate Record Examination

Students planning to enter graduate school should take the GRE in the fall of their senior year. This exam is required by many graduate schools and for most graduate fellowships. Details may be obtained from the Graduate School Fellowships Office, 217 Bascom Hall.

Special Programs

Engineering Honors in the Liberal Arts

The Engineering Honors in the Liberal Arts program is designed for engineering students with unusual ability and interest in the liberal arts and who desire access to the special honors sections open to L&S honors students. For further information, see the Undergraduate Catalog or contact Dr. Suzannah Sandrik in the Engineering General Resources office, 1150 Engineering Hall (262-4794).

Certificate in Technical Communications

The completion of approximately 15 elective credits in oral communication and technical writing leads to a Certificate of Technical Communication; the award is noted on the student's transcript. Representative courses include EPD 397 "Technical Writing," EPD 398 "Technical Communications Internship," EPD 275 "Technical Presentations," EPD 395 "Elements of Computer-Assisted Publishing," and CA 464 "Theory and Practice of Persuasion." The program will help students become better communicators as Engineers or will prepare them to pursue careers in technical writing. Contact the Department of Engineering Professional Development (Room M1050 Engineering Centers Building, 262-2472) for further information.

Certificate in Japanese Studies for Engineering Majors

The completion of the following courses leads to a Certificate in Japanese Studies for Engineering Majors; the award is noted on the student's transcript: East Asian 253 "Introduction to Japanese Civilization" (3 cr.); East Asian 103 and 104 "First and Second Semester Japanese" (12 cr.); EPD 374 and 375 "Technical Japanese I and II" (6 cr.); History 455 "Japan's Modern Century" (4 cr.); and Business 461 "Comparative Management in Asia" (3 cr.) or other courses in Japanese studies. The student should note that, of the total of 28 credits, at least 17 may qualify as Liberal Electives. Contact Professor James L. Davis (Room 1056D Engineering Centers Building, 262-4810) for further information.

Letters & Science Second Major for Engineering Students

Many **EM** students can easily satisfy the requirements of the Mathematics or Physics Departments for a second major by choosing appropriate electives. Such a second major is recorded on the transcript. Second majors must be approved in advance, first by the appropriate L&S department (by approval of a "Declaration of Major" form) and then by the Associate Dean of the College of Engineering. For details see the L&S Bulletin.

The requirements of the Physics Department for a second major are 30 credits of Physics courses plus a laboratory requirement. There are two options by which a student may satisfy the requirements of the Mathematics Department for a second major. For an **EM** student the simplest option requires six courses beyond Math 234, and the six must include Math 320 or 340 and at least two math courses numbered above 500. Consult with the appropriate department office for the latest requirements.

Additional Information

Department Colloquia

Colloquia are academic seminars on a broad field of study, usually led by a different lecturer at each meeting. The UW EM colloquia series presents the work of experts outside of the university to the faculty and students, broadening the understanding of the current scientific cutting edge, while presenting the university capability to the visitor. These lectures are announced on the Department bulletin board outside 153 ERB and the College of Engineering on-line calendar on the COE website. Colloquia are usually held on Tuesday afternoons at 4:00 PM (refreshments at 3:45 PM). Undergraduates are encouraged to attend.

AIAA Student Chapter

Undergraduates in both the standard **EM** Program and the Astronautics option are urged to join the *American Institute of Aeronautics and Astronautics*. This gives them an opportunity to meet other students, take an active part in organizing activities, meet visiting speakers, and hear talks in their fields presented on a level appropriate for undergraduates. Student involvement in such activities is viewed favorably by prospective employers. The AIAA advisor is Prof. Dan Kammer (539 ERB, 262-5724, kammer@enr.wisc.edu). The AIAA web site is at <http://www.engr.wisc.edu/studentorgs/aiaa>.

Engineering Expo

The Engineering Expo is a biennial event (held in spring of odd-numbered years) that gives the public a unique opportunity to learn about engineering. It is also a great learning experience for students, one that is highly regarded by employers. Students can contribute a few hours per semester or several hours per week - from working on an exhibit to planning publicity. You might consider joining with the AIAA chapter and other students in preparing exhibits that demonstrate engineering mechanics and astronautics concepts. Interested students should speak with their advisor.

Faculty-Student Committee (FSC)

The **Engineering Physics Department** wants input from **EM**, **NE** and **EP** students. A standing committee of students and two faculty members exists to discuss problems and bring them to the attention of the Department. Student members are encouraged to attend Department meetings and to present student opinions at these meetings. The FSC conducts a survey periodically of all **NE**, **EP** and **EM** students for the purpose of finding out about problems. In addition, a **Suggestion Box**, located outside room 105 ERB, is available for comments and suggestions. Recommendations on course, curriculum changes, and Department procedures are taken very seriously by the faculty. In the past, most recommendations have been implemented. For more information, contact Professors Plesha or Witt.

Duplicating

Students who need to use duplicating equipment for research projects must get permission from their professor and a fund and account number to charge. Senior Design Project duplicating should be approved by the Department office. Use of departmental photocopying equipment for personal purposes is not permitted.

Personal Property

Any personal property, including personal computers and reference textbooks, are the responsibility of the student. Neither the Department nor the University will assume liability for loss or damage of any personal belongings or equipment.

Departmental Office Staff

Name	Title	Office	Phone	E-mail address
Michael Corradini	Chair	151 ERB	263-1648	corradini@engr.wisc.edu
Dianne Francis	Chair's Assistant	153 ERB	263-1646	dfrancis@engr.wisc.edu
Betsy Wood	Student Records	144 ERB	263-7038	bwood@engr.wisc.edu
Mark Swandby	Administrator	146 ERB	263-1647	swandby@engr.wisc.edu
Nancy Griego	Human Resources	145 ERB	263-5966	griego@engr.wisc.edu
Jennifer Haukohl	Financial Records	103 ERB	262-5723	haukohl@engr.wisc.edu
Joan Welc-LePain	Research Administrator	533 ERB	890-1877	jlepain@engr.wisc.edu
John Murphy	Researcher	147 ERB	265-4186	jmurphy@engr.wisc.edu

Reactor Lab Staff

Robert Agasie	Reactor Director	1209 ME	262-3392	agasie@engr.wisc.edu
Michelle Blanchard	Reactor Supervisor	141 ME	262-3392	mblanchard@engr.wisc.edu
Kevin Austin	Reactor Research Mgr.	101 ME	262-3392	kaustin@engr.wisc.edu
Corey Edwards	Reactor Inst Tech	5 ME	890-1924	csedwards@engr.wisc.edu

Engineering Mechanics Faculty

The Engineering Physics department has a faculty of 23 professors, and several lecturers, adjunct and emeritus professors. Some are primarily associated with the Engineering Mechanics Program and some with the Nuclear Engineering and Engineering Physics Program.

Matthew S. Allen	Assistant Professor	535 ERB	890-1619	msallen@engr.wisc.edu
Todd R. Allen	Assistant Professor	529 ERB	265-4083	allen@engr.wisc.edu
Vicki Bier	Professor (also IE)	3234 ME	262-2064	bier@engr.wisc.edu
Joseph Bisognano	Professor (Dir SRC)	103 SRC	877-2163	jbisognano@src.wisc.edu
James P. Blanchard	Professor	143 ERB	263-0391	blanchard@engr.wisc.edu
Riccardo Bonazza	Professor	537 ERB	265-2337	bonazza@engr.wisc.edu
Michael Corradini	Professor (also ME/IES)	151 ERB	263-1648	corradini@engr.wisc.edu
Wendy Crone	Associate Professor	543 ERB	262-8384	crone@engr.wisc.edu
Walter J. Drugan	Professor	527 ERB	262-4572	drugan@engr.wisc.edu
Raymond J. Fonck	Professor	341 ERB	263-7799	fonck@engr.wisc.edu
Chris C. Hegna	Professor	521 ERB	263-0810	heгна@engr.wisc.edu
Douglass Henderson	Professor	411 ERB	263-0808	henderson@engr.wisc.edu
Noah Hershkowitz	Professor	337 ERB	263-4970	hershkowitz@engr.wisc.edu
Daniel C. Kammer	Professor	539 ERB	262-5724	kammer@engr.wisc.edu
Gerald L. Kulcinski	Professor (Assoc Dean)	2630b EH	263-1601	kulcinski@engr.wisc.edu
Roderick S. Lakes	Professor	541 ERB	265-8697	lakes@engr.wisc.edu
Gregory A. Moses	Professor	407 ERB	265-6567	moses@engr.wisc.edu
John M. Pfothhauer	Professor (also ME)	1329 ERB	263-4082	pfot@engr.wisc.edu
Michael E. Plesha	Professor	525 ERB	262-5741	plesha@engr.wisc.edu
Leslie Smith	Professor (also Math)	505 VV	263-3057	lsmith@math.wisc.edu
Carl R. Sovinec	Associate Professor	519 ERB	263-5525	sovinec@engr.wisc.edu
Francesco Volpe	Assistant Professor	331 ERB	262-4854	fvolpe@wisc.edu
Fabian Waleffe	Professor (also Math)	819 VV	262-3269	waleffe@math.wisc.edu
Paul Wilson	Associate Professor	419 ERB	263-0807	wilsonp@engr.wisc.edu
Robert J. Witt	Associate Professor	531 ERB	263-2760	witt@engr.wisc.edu

Frequently Asked Questions

The class I need to get into is full. What do I do?

If it is an EMA, EP or NE course, check with the Student Coordinator (Betsy Wood, 144 ERB, 263-7038) to see if additional sections are being opened or if the registration limit will be raised. If the class is offered through a different department, check with their department office. Also see your advisor about other options available to you.

Where is my Professor's/TA's office and mailbox?

The EM faculty have offices in ERB. Mailboxes are located on the first floor near the loading dock. The EM TA's are primarily in Engineering Hall; their mail boxes are in the first-floor lobby area of Engineering Hall, west of the main entrance. Check your course syllabus for your Professor's and TA's office number and office hours.

What if I am sick and miss class?

Contact your TA or Professor and inform him/her if you will be missing more than one class meeting. You will be expected to make up any work that you miss. If a serious illness arises and you cannot attend classes for an extended period, contact the Engineering Student Services Office at 262-2473.

Where is the lost & found?

The Engineering Hall Lost & Found office is located in Room 1035 Engineering Hall, phone 263-5586. Occasionally, items are turned into the Department Office. The ERB Lost and Found office is located in Room 132C ERB, 263-1624 (the mailroom).

I finished my final exam. Can the Department Office tell me my grade for the course?

The Department office CANNOT disclose final grades. Check with your Professor or TA. After final grades have been turned into the Registrar's office you can get your grades using your MyUW website.

What if I feel that my grade is unfair?

First, speak to your TA or Professor. If this does not resolve your problem, then see the faculty member in charge of your course. Office hours are posted on all faculty and TA doors. If you do not receive sufficient explanation for your grade, then you may make an appointment to speak with the Chair. See the Department Office to set up a meeting time. Be sure to bring copies of any exams or quizzes with you.

Does the department have a website?

Yes. The following websites provide helpful information;

Engineering Physics:

<http://www.engr.wisc.edu/ep/>

Nuclear Engineering and Engineering Physics:

<http://www.engr.wisc.edu/ep/ne/>

College of Engineering:

<http://www.engr.wisc.edu/>

AIAA chapter:

<http://www.engr.wisc.edu/studentorgs/aiaa>

ANS chapter:

<http://www.atomicbadger.org/>

WIN (Women in Nuclear) chapter

<http://uw-win.org>