Engineering Physics

A Guide for Undergraduate Majors

Last modified Fall 2020

This guide applies to students entering the program after August 2020. Students admitted prior to this 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

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https://www.engr.wisc.edu/department/engineering-physics/

Introduction

The **Engineering Physics Undergraduate Program (EP)** is administered by the **Department of Engineering Physics**. The Department Office is room 151 Engineering Research Building (ERB). The Department Chair's office is also in room 153 ERB. The department also administers the Engineering Mechanics undergraduate and graduate programs (EM) as well as the Nuclear Engineering undergraduate (NE) and the Nuclear Engineering and Engineering Physics graduate programs (NEEP).

This guide is intended to provide **Engineering Physics** 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** (https://guide.wisc.edu/) for requirements, objectives, and course descriptions. You may also find the resources page at the UW website helpful https://www.admissions.wisc.edu/

The **Engineering Physics Department** web site is https://www.engr.wisc.edu/department/engineering-physics/. There are links to the Engineering Physics, Engineering Mechanics, and Nuclear Engineering programs. Updated curriculum and course information is included on the department website. The College of Engineering website (www.engr.wisc.edu) also provides information for engineering students.

We welcome you to the **Engineering Physics Program**, and wish you a successful undergraduate career!

Bachelor of Science in Engineering Physics

The B.S. in **Engineering Physics** degree is designed for the ever-changing technologies and opportunities of the 21st century. The degree is designed to provide graduates with skills in emerging technological areas. These graduates are highly prepared to pursue advanced graduate degrees and will become a source of qualified employees for high-tech start-up companies and traditional engineering firms, as well as positions in academia, government, and national laboratories. As part of the **Engineering Physics** degree program, students specialize in a technological focus area of their choosing. At present the available technological focus areas are:

- Nanoengineering
- Plasma Science and Engineering
- Scientific Computing

(1) Nanoengineering Focus Area: The field of nanoengineering aims to establish new paradigms in design, fabrication, and modeling of materials and devices that are structured at an extremely small scale, i.e., the atomic/molecular/nano scale. The laws of physics enter new regimes at this scale, and conventional engineering rules need to be completely re-evaluated in order to enable previously unattainable properties and performance in applications that include sensors, actuators, lasers, quantum computers, power generation, and ultrastrong materials. The particular focus in this curriculum is on nanostructured materials, their structural and mechanical properties, and their applications.

(2) Plasma Science and Engineering Focus Area: Plasma is the fourth state of matter – a gas so hot ($> 10^4$ K) that the electrons are dissociated from nuclei in an electrically active medium. Key applications of plasmas in EP at UW-Madison include: fusion of light nuclei in a magnetized plasma for an environmentally benign new energy source and plasma processing of semiconductors and other materials. The fusion program is part of a large, well-funded campus-wide activity. Its emphasis is on innovative magnetic confinement concepts – spherical torus (Pegasus; EP), reversed field pinch (MST; Physics), and quasi-symmetric torus (HSX; ECE) – and includes the cross-departmental Center for

Plasma Theory and Computation (CPTC; EP, ECE and Physics) and Fusion Technology Institute (FTI). The plasma processing area focuses on plasma source ion implantation for processing the surface of materials.

(3) Scientific Computation Focus Area: Advances in computing technology over the last decade have allowed for the computational simulation of physical systems to offer a realistic alternative to physical experimentation to gain fundamental insights. As such, scientific computing has become a third branch of scientific exploration, in many ways at the confluence of the other two, theory and experimentation. While scientific computing is a broad and varied field, in the UW-Madison EP Department, scientific computing is an essential part of research in radiation transport, radiation hydrodynamics, fusion plasma physics, and fission reactor systems. Students in this focus area will graduate with direct experience in one of these research fields while developing skills to apply to many other fields in physics and engineering.

Distinguishing Features of Engineering Physics B.S. Degree:

- Strong emphasis on math and physics, and engineering fundamentals
- Choice of a technical focus area, made by the junior year
- Emphasis on a research project, culminating in a senior thesis

Objectives and Expected Outcomes

The objectives of the **Engineering Physics** program are to:

(a) Educate students to think and participate deeply, creatively, and analytically in emerging areas of engineering technology.
(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 research.
(d) Provide and facilitate teamwork and multi-disciplinary experiences throughout the curriculum.
(e) Foster the development of effective oral and written communication skills.
(f) Expose students to environmental, ethical and contemporary issues.

Engineering Physics 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 apply advanced mathematics, science and engineering physics
    (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 work professionally in companies involved in emerging technology areas, i.e. nano-engineering, scientific computing or plasma science and engineering.
3. An ability to design and conduct experiments, as well as to analyze and interpret data.
4. An ability to function on diverse multi-disciplinary teams.
5. Knowledge of professional and ethical standards.
6. An ability to communicate effectively.
7. The broad education necessary to understand the impact of engineering solutions in a global and societal context.
8. A recognition of the need for, and ability to engage in, life-long learning.
9. A knowledge of contemporary scientific and technological issues.

Requirements for Admission and for Continued Enrollment for Students Entering in Fall 2020

Students who begin this program after August 2018 will be required to meet the requirements described below.

To continue in a College of Engineering (CoE) degree program after direct admission or to be considered for admission to a CoE degree program after enrollment at UW-Madison as part of another engineering classification, students must complete the following requirements (GCR15 – General College Requirements 2015) after one year of residency at UW-Madison:

1. Complete at least **four core courses** at UW-Madison, as follows (all math and science courses as qualified below will constitute the **core GPA**):
    a. **Math:** A minimum of two math courses 217 or above (excludes math 228 and math 473); or one math 300 level or above; not including special topics, independent study or seminar courses.*
    b. **Science:** A minimum of two science courses as shown below.
        (i) one course must be either Chemistry 104 or higher OR physics 201/EMA 201 or higher
        (ii) one other science course, from the following**:
            - chemistry, all classes
            - EMA 201, EMA 202, ME 240
            - Physics 201 and above
            - Calculus-based Statistics 224 and above
            - EP 271
            - Computer Science 302 or above, excluding CS 304
            - not including special topics, independent study or seminar courses.
    c. For one and only one of these courses that a student has repeated, the more recent of the two grades will be used in the calculation of core and overall GPA's.
    d. **Core GPA:** All courses that satisfy (a) and (b) above and any departmental engineering courses 200 or above taken (not including special topics, EPD, InterEGR, independent study or seminar courses) during the first year will be counted in the core GPA.

*If the math requirement for the degree program is completed upon entry at UW-Madison then additional courses from section (b) can also be completed for a minimum of 4 core courses (not including special topics, EPD, InterEGR, independent study or seminar courses)

**If the math and science requirement for the degree program is completed upon entry at UW-Madison then departmental engineering courses 200 or above can also comprise the minimum 4 core courses (not including special topics, EPD, InterEGR, independent study or seminar courses).

2. Complete the General Education Communications Skills Part A requirement (placement test, AP/IB or transfer credit may be used). If Comm. A is completed prior to attending UW-Madison, then a 3 credit liberal studies course (with a breadth designation of H, L, S, or Z) must be taken on a traditional graded basis at UW-Madison. Independent studies and seminar courses may not be included.
3. Complete the Design Practicum (InterEGR 170) or an Introduction to Engineering course (ME 201, CBE 150, MSE 260, ECE 210, ECE 252, GLE 171, or ISyE 191).
4. Successful completion of math through Math 222 or Math 276
5. At least 24 credits including English as a Second Language courses if needed, completed at UW-Madison. Independent study, special topics, seminar courses, pass/fail or credit/no credit courses will not be included in the 24 credits.

6. After one year of residency at UW-Madison, for students to continue within a CoE degree granting program or to move from EGR to a degree granting program, students must meet Core and Overall GPA as defined by departmental curricula and must not be on academic probation for GPA reasons at time of consideration. Please contact your advisor if you have questions.
    a. The minimum Core GPA for the Engineering Physics program is 3.5.
    b. The minimum Overall GPA for the Engineering Physics program is 3.0
7. Students who are making satisfactory progress but do not meet above requirements in one-year may apply for a one-semester extension up to their fourth semester. Extensions will be considered only in cases where it is mathematically possible during the extension to meet requirements.
8. Students cannot remain in their departments or in EGR status beyond their 4th semester without completing above requirements.
9. Students who do not meet automated admission under the rules of this section and who are within 0.30 grade points of the Core GPA requirements indicated in Rule 6 and/or have experienced significant extenuating circumstances impacting student's core GPA are encouraged to file an appeal of the admission decision. An appeal will trigger a holistic review process, which will include appeal statement, course rigor and grade trends.

A more in-depth discussion of the progression requirements can be found at the following weblink: https://www.engr.wisc.edu/academics/student-services/academic-advising/first-year-undergraduate-students/progression-requirements

Undergraduate Research Project

Expectations for Research Projects
Completion of the EP degree program requires satisfactory completion of the EP 468, EP 469, EP 568, EP 569 coursework sequence which culminates in a senior research thesis. The research topic chosen by the student and agreed upon by their advisor should be on a topic connected to their chosen Focus Area. The research conducted 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 if one results from the research.

Senior Thesis
A senior thesis, completed during enrollment in EP 569, 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 faculty advisor, in consultation with the research mentor, determines the grade which the student receives for the thesis. A bound copy of the thesis must be submitted to the Engineering Physics Department Office.

On or before the Friday of finals week of the semester in which EP 569 is taken, the senior thesis must be presented orally 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
All EP students will be considered for the "Honors in Research" designation upon graduation if the following requirements are met:

1. Satisfaction of requirements for an undergraduate degree in Engineering Physics
2. A cumulative grade-point average of at least 3.3.
3. Completion of EP 468, EP 469, EP 568, EP 569 for a total of 8 credits.
4. Completion of a senior thesis (EP 569) with a grade of B or better.

If these requirements are satisfied, the designation "Honors in Research" will be recorded on the student's transcript and diploma.

ENGINEERING PHYSICS B.S. DEGREE CURRICULUM

Fall Semester Freshman Year	
Chem 109 Advanced General Chemistry	5
Math 221 Calc & Analytic Geometry	5
Communications "A" Elective	3
InterEgr 170 Design Practicum[2]	3
Total	**16**

Spring Semester Freshman Year	
EMA 201 Statics[1]	3
Math 222 Calc. & Analytical	4
Physics 202 General Physics[1]	5
Liberal Studies Elective	3
Total	**15**

Fall Semester Sophomore Year	
Math 319 Differential Equations	3
Physics 241 or 205 Modern Physics	3
Physics 311 Mechanics[4]	3
CS 310/EP 271 Engr. Prob.Solving	3
EPD 275 or CA 105 Public Speaking	2
Statistics 324[5]	3
EP 468 Intro to Engr Research	1
Total	**18**

Spring Semester Sophomore Year	
Math 234 Calculus–Fn. Of Several Var.	4
Physics 322 Electromagnetic Fields[3]	3
MSE 350/351 or CBE 440 Intro Mat Sci	3
ME 306/EMA 303 Mechanics of Materials	3
ME307/EMA 307 Mechanics of Mat. Lab	1
Liberal Studies Electives	3
EP 469 Research Prop in EP	1
Total	**18**

Fall Semester Junior Year	
NE 305 Fund of Nuclear Engineering or Physics 531 Quantum Mech[6]	3
EP Focus Area Course	3
Math 321 Applied Analysis	3
ME 361 or MSE 330[7] Engr Thermo	3(4)
Computing Elective	3
Total	**15(16)**

Spring Semester Junior Year	
Technical Elective	3
InterEgr 397 Technical Communication	3
ECE 376 or Physics 321 Circuits	3(4)
Math 340 or 341 Linear Algebra	3
Liberal Studies Elective	3
Total	**15(16)**

Fall Semester Senior Year	
EP 568 Research Pract in EP I	3
ME 363 Fluid Dynamics	3
EP Focus Area Course	3
EP Focus Area Course	3
Liberal Studies Elective	4
Total	**16**

Spring Semester Senior Year	
EP 569 Research Pract in EP II/Sr Thesis	3
EP Focus Area Course	2
ME 364 Heat Transfer or MSE 331 Transp Phen in Matls	3
Technical Elective[8]	3
EP Focus Area Course	3
Liberal Studies Elective	3
Total	**17**

Total number of course credits required for B.S. EP degree: 130-132

[1] Physics courses (such as 207 and 208 or 247, and 248) are recommended for B.S. EP students and may be substituted for Statics, General Physics, Modern Physics, respectively.

[2] Students who were not able to take InterEgr 170 as freshman 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] Topics from Math 321 are applied in Physics 322, and some students may find it helpful to take Physics 322 after Math 321 if Physics 322 is not required for focus area courses.

[4] Physics 311 is highly recommended for all EP majors, but EMA 202 Dynamics is an acceptable substitute.

[5] The curriculum requires Stat 324; EP students are encouraged to take a more challenging course such as Statistics 311 or 431.

[6] Physics 531 Intro to Quantum Mechanics should be taken by students in the Nanoengineering Focus Area. It is a prerequisite for the required focus area course Phys 551 Solid State Physics.

[7] MSE 330 is highly recommended for students in the Nanoengineering Focus Area.

[8] Math 322 is also a useful course and it may be of particular value for students interested in graduate study.

Electives Requirements

Liberal Studies Electives (16 credits)
Sixteen credits that carry H, S, L, or Z 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)

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. These credits may help satisfy regulations I or II as well, but may count only once toward the total credits required.

Communications "A" Elective (3 cr)

Students must take one course from the following list:

English 100	Intro to College Composition	3 credits
Comm Arts 100	Introduction to Speech Composition	3 credits
L SC COM 100	Introduction to Communication	3 credits
ESL 118	Academic Writing II	3 credits

Many students find it useful to take a Communication “A” elective and InterEgr 170 concurrently in the fall semester of their freshmen year.

Communications "B" Elective
This requirement is met by InterEgr 397, which is a required course. Other Communication “B” courses may be substituted upon approval of the department chair.

Computing Elective (3 cr)

Students must take one course from the following list:

CS 300	Programming II	3 credits
CS 412	Introduction to Numerical Methods	3 credits
EP 471	Engineering Problem Solving II	3 credits
EP 476	Intro to Computational Engineering	3 credits

Note: Students in the Scientific Computing Focus Area must take CS 412.

Technical Electives (6 cr)

Students need 6 credits at an academic level that requires 2 semesters of calculus or 2 semesters of physics as a prerequisite. Cooperative Education Program credits may also be used to satisfy this requirement.

Focus Area Electives (14 cr)

EP Focus Area Courses

	Nanoengineering	Plasma Science & Engineering	Scientific Computing
Required	Phys 551 Solid State Physics **and** EP/EMA 615 Micro & Nano-Scale Mech **or** MSE 553 Nanomaterials & Nanotechnology	NE (NEEP)/ECE/Phys 525 Intro to Plasmas	
At Least One of ...	EMA 506: Adv. Mech of Materials EMA 622: Continuum Mechanics EMA 519: Fracture Mechanics	NE/ECE/Physics 527 Plasma Confinement & Heating NE/ECE 528 Plasma Processing and Technology	NE 506 Monte Carlo Radiation Trans ME 573 Comp. Fluid Dynamics EMA 605 Intro to Finite Elements ECE 742 Comp. Methods in Electromagnetics
At Least One of ...	MSE 448 Crystallography & X-Ray Diff EMA 611 Adv. Mech Testing of Mat'ls ME 601 Micro & Nano Fabrication NE 602 Special Topics: Vacuum Technology Lab Phys 623 Electronic Aids to Measurement Phys 625 Applied Optics MSE 748 Structural Analysis of Materials MSE 770 Meth of Surface & Interface Analysis	NE 526 Laboratory Course in Plasmas	Students must take at least two credits of laboratory experience in the Physical or Biological Sciences
Open Electives	MSE 333 Microprocessing Materials ECE 335 Microelectronic Devices MSE 434 Intro to Thin-Film Deposition Processes MSE 441 Deformation of Solids ECE 445 Semiconductor Physics & Devices MSE 451 Intro to Ceramic Materials EMA 541 Heterogeneous and Multiphase Materials CBE/MSE/ECE 554 Processing of Elect Materials MSE 560 Fundamentals of Atomistic Modeling MSE 570 Properties of Solid Surfaces ECE 602 Nanolithography: Theory & Application. Chem 630 Surface and Interface Chemistry MSE 756 Adv Microelecronic Materials	NE 408 Ionizing Radiation NE 536 Feasibility St of Power from Controlled Nuclear Fusion Any plasma related special topics course in NE (NE 602 or 903) Phys 415 Thermal Physics Physics 623 Electronic Aids to Measurement Phys 625 Applied Optics NE/ECE/Phys 724 Wave & Instabilities in Plasmas NE/ECE/Phys 725 Plasma Kinetic Theory & Radiation Processes NE/ECE/Phys 726 Plasma Magnetohydrodynamics	EP 476 Intro to Scientific Computing CS 300 Programming II CS 513 Numerical Linear Algebra CS 514 Numerical Analysis Any scientific-computing- related special topics course in NE (601, 602, etc.) CS 525 Linear Programming Methods CS 577 Introduction to Algorithms CS 714 Methods f Comp Math I CS 715 Methods f Comp Math II MSE 560 Fundamentals of Atomistic Modeling ME 759 High-Performance Computing for Applications in Engineering

Note: Any of the Focus Area Courses listed under the "One of ..." categories within a focus area which are not used to fulfill the requirement may be used as an open elective.

Advising

First year EP students will be assigned an advisor from the CoE Student Services Center, 1410 Engineering Drive, Suite 170. Continuing students who have fulfilled the progression requirements (page 5) will be assigned an EP faculty advisor starting with their second year. **Students retain the same advisor until graduation, even if they do not progress in class standing at the normal rate.** The list of faculty advisors is available in the Department office. Before enrolling in courses each semester, student must meet with their faculty advisor for assistance in planning courses and meeting degree requirements. **Students must consult with their advisor and turn in their course advising form to the Student Services Center before enrolling for the semester. A hold well be placed on students' accounts to prevent enrollment until this form is received.**

Wait Listed Courses: In any given semester, courses may fill up quickly depending on demand. Some courses may have a wait-list established through the enrollment system. Students will be notified by email if they have been given permission to enroll from the wait-list. The department will assist students in enrolling for the courses they need. However, there is no guarantee that students will be allowed into a wait-listed section. If it is an EMA, EP, or NE course, contact the Student Services Center to see if additional sections will be opened or if the registration enrollment will be raised. Also, see your advisor about other options available to you.

Grievance Procedure

Students who feel treated unfairly have the right to a prompt hearing of their grievance. Such complaints may involve course grades, classroom treatment, advising, various forms of harassment, or other issues. Any student or potential student may use these procedures.

Procedures for proper accounting of student grievances:

- The student should speak first with the person toward whom the grievance is directed. In most cases, grievances can be resolved at this level.
- Should a satisfactory resolution not be achieved, the student should contact the program's Grievance Advisor to discuss the grievance. The Graduate Program Coordinator can provide students with the name of this faculty member, who facilitates problem resolution through informal channels. The Grievance Advisor is responsible for facilitating any complaints or issues of students. The Grievance Advisor first attempts to help students informally address the grievance prior to any formal complaint. Students are also encouraged to talk with their faculty advisors regarding concerns or difficulties if necessary. University resources for sexual harassment concerns can be found on the UW Office for Equity and Diversity website.
- If the issue is not resolved to the student's satisfaction the student can submit the grievance to the Grievance Advisor in writing, within 60 calendar days of the alleged unfair treatment.
- On receipt of a written complaint, a faculty committee will be convened by the Grievance Advisor to address the grievance. The faculty committee will obtain a written response from the person toward whom the complaint is directed. The response will be shared with the person filing the grievance.
- The faculty committee will determine a decision regarding the grievance. The Grievance Advisor will report on the action taken by the committee in writing to both the student and the party toward whom the complaint was directed within 15 working days from the date the complaint was received.
- At this point, if either party (the student or the person toward whom the grievance is directed) is unsatisfied with the decision of the faculty committee, the party may file a written appeal. Either party has 10 working days to file a written appeal to the College of Engineering.
- Documentation of the grievance will be stored for at least 7 years. Significant grievances that set a precedent will be stored indefinitely.

The Dean of Students Office has established policies governing student conduct, academic dishonesty, and sexual and racial harassment. The Dean of Students Office also has procedures for students wishing to appeal a grievance decision made at the college level. These policies are described at http://www.students.wisc.edu/doso/.

DARS Reports

The DARS (Degree Audit Reporting System) report is a computer-generated record of courses students have taken and where students stand relative to degree requirements. It is an aid to help students and their advisors in tracking progress towards graduation. This record can be obtained through the **MyUW** system. Students should be aware that the DARS report is **unofficial** and may contain errors. **Students should check their DARS report on a regular basis for errors and bring them to the attention of their advisor**, so that corrections can be made. Student records will still be subject to an audit at graduation.

Tips to Help Students

Course Planning

There are several sequences of courses in the program in which one course is a prerequisite for the next course in the sequence. Because some courses are only taught one semester each year, if students do not plan their program in advance, they may find their graduation delayed by as much as a year. If students do not follow the standard four-year program, they should prepare an alternative program in advance and check it with their advisor. Any deviation from this plan should be carefully considered with respect to prerequisites and course offering frequencies. Students should use the Degree Planner tool to assist them in planning their schedule: https://registrar.wisc.edu/degree-planner/.

Independent Study - EP 699

Undergraduate students can enroll in Independent Study (EP 699), to gain additional 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 credits earned (usually 1-3) per semester. **Note, however, that this work must be considered independently from the EP research sequence (EP 468, 469, 568, 569) and Senior Thesis.**

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 semester (co-op) or a summer (internship). 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 with Dennis Manthey, Dept. Administrator, (146 ERB, 263-1647) and the Engineering Career Services office, Engineering Hall, Room 1150, for further information.

Study Abroad

Research is an increasingly global activity and developing global competency is important for engineers. One way to improve global competency is to take part in a Study Abroad experience. Roughly a quarter of EP majors take part in a study or work abroad experience prior to graduation. More detailed information about opportunities can be found at:
https://www.engr.wisc.edu/academics/beyond-the-classroom/study-abroad/

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. **Note, however, that this paid work should be independent from the work done towards the EP research sequence (EP 468, 469, 568, 569) and Senior Thesis.** If there is overlap between the two, the student should negotiate the hours needed towards the coursework that semester. Additional hours may be paid.

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 your instructors, advisors, research mentor, or faculty employers know you quite 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. Participating in class discussions and asking many intelligent questions is also helpful.

Professional Registration

The Department of Engineering Physics has not sought ABET accreditation for the Engineering Physics undergraduate degree although other degrees offered by the department are ABET accredited. The Engineering Physics undergraduate degree is intended for those who plan to go on to graduate studies and/or a research-related career. Although the lack of ABET accreditation does not preclude one from obtaining professional licensing, the process is somewhat longer in most states that license professional engineers.

Registration as a professional engineer is a requirement for some engineering jobs. The registration process requires exams on Fundamentals of Engineering (FE) and on the principles and practice of engineering. Seniors can usually pass these exams easily and are urged to take them. 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. Information may be obtained from: Wisconsin Department of Safety and Professional Services, 55 N. Dickinson St., Madison, WI 53703, phone 608-266-2112, http://dsps.wi.gov/Home; NCEES, http://ncees.org/, has information and study guides for the FE exam.

Special Graduation Requirements

Students should particularly note the requirements for graduation given in Rule 34 of the "Official Regulations Regarding Enrollment, Scholarship, and Graduation for Undergraduates in The College of Engineering of University of Wisconsin-Madison" (https://www.engr.wisc.edu/app/uploads/2016/01/CoE_Official_Regulations.pdf). Among other requirements, paragraph 34 specifies GPA requirements for the last 60 credits, for courses taken in the major, and for the student's last semester and last two semesters.

Credit for Previous Work

Students who have done college level work elsewhere can usually transfer credits earned at other colleges. Contact the Student Services Center, 1410 Engineering Drive, Suite 170, to discuss 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). You may also refer to https://scholarships.wisc.edu/Scholarships/. 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.

Graduate Study

M.S. and Ph.D. in Engineering Mechanics or Nuclear Engineering and Engineering Physics
The Department offers the Master's of Science and Doctor of Philosophy degrees in Engineering Mechanics and in Nuclear Engineering and Engineering Physics. Students interested in graduate work in **EM** or **NEEP** at Wisconsin should visit the Department website, http://www.engr.wisc.edu/department/engineering-physics/academics/, and the Graduate School website, http://grad.wisc.edu Additional information about opportunities and financial aid may be obtained from the Department Administrator, Mr. Dennis Manthey (146 ERB). You may also find helpful information about graduate financial aid at the website http://grad.wisc.edu/studentfunding/prospective/. Information from other graduate schools is available on the bulletin board outside the Department Office, in Wendt library, and in the Graduate School.

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

There are several Certificates available in the College of Engineering:

- Biology in Engineering Certificate
- Certificate in Energy for Energy Sustainability
- Certificate for Engineering Thermal Energy Systems
- Certificate in Integrated Studies in Science, Engineering and Society
- Certificate in International Engineering
- Certificate in Japanese Studies for Engineering Majors
- Certificate in nuclear Engineering Materials
- Certificate in Technical Communications

Some of the available options are highlighted below.

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 https://www.engr.wisc.edu/academics/undergraduate-academics/honors/

Technical Communications Certificate

The Technical Communication Certificate (TCC) is designed for undergraduate students who want to broaden their communication skills beyond the Comm-A and Comm-B requirements. The program will help students become better communicators as Engineers or will prepare them to pursue careers in technical writing. For further information, see http://tc.engr.wisc.edu/certificate/

Certificate in Japanese Studies for Engineering Majors

This certificate program is designed to help an undergraduate engineering student gain conversational and written skills in colloquial Japanese, reading and translation skills in technical Japanese, and an understanding of Japanese culture. For further information, see: https://www.engr.wisc.edu/academics/undergraduate-academics/certificate-in-japanese-studies-for-engineering-majors/

Letters & Science Second Major or Certificate for Engineering Students

Many EP students can easily satisfy the requirements of the Mathematics or Physics Departments for a second major or certificate by choosing appropriate electives. Such a second major or certificate is recorded on the transcript. Second majors and certificates must be approved in advance, first by the appropriate Letters &Sciences department (by approval of a "Declaration of Major" form) and then by the Associate Dean of the College of Engineering. For more information, see the appropriate Letters & Sciences department's website.

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 EP 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

AIAA Student Chapter

Undergraduates in both the standard **EM** Program and the Aerospace 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. Matt Allen (525 ERB, 890-1619, msallen@engr.wisc.edu). The AIAA web site is at http://aiaa.coerso.wisc.edu/

Society for Women Engineers (SWE)

The society of Women Engineers (SWE), founded in 1950, is a not-for-profit educational and service organization. SWE is the driving force that establishes engineering as a highly desirable career aspiration for women. SWE empowers women to succeed and advance in those aspirations and be recognized for their life-changing contributions and achievements as engineers and leaders. Contact 1410 Engineering Drive, Room 145B, sweofficersuw@gmail.com. The SWE web site is at http://swe.slc.engr.wisc.edu.

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 aerospace concepts. Interested students should speak with their advisor.

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.*

Departmental Contacts

EP Department Staff & Faculty - https://www.engr.wisc.edu/department/engineering-physics/people-in-ep/

Student Services Center, 1410 Engineering Drive, Suite 170, Phone: (608) 262-3471

Frequently Asked Questions

Where is my Professor's/TA's office and mailbox?
The EM faculty members have offices in the Engineering Research Building (ERB). Mailboxes are located on the first floor near the loading dock. The department TAs are also in the ERB; mailboxes are on the first floor near the loading dock. Check your course syllabus for your Professor's and TA's office number and office hours.

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).

Does the department have a website?
Yes. The following websites provide helpful information:

Engineering Physics: http://www.engr.wisc.edu/ep/
College of Engineering: http://www.engr.wisc.edu/
AIAA chapter: http://aiaa.coerso.wisc.edu/
ANS chapter: http://www.atomicbadger.org/