

Advising Tips for Undergraduate Advisors

Created August 4, 2005

Updated December 11, 2014

Whether a faculty member advises undergraduates for the first time or begins anew with the next cycle of freshmen, these tips will help students decide the best course of action for their degree programs.

GENERAL INFO

- **READ THE MECHANICAL ENGINEERING UNDERGRADUATE ADVISING MANUAL:** Please read the department's Undergraduate Academic Advising Manual, available at <http://www.me.jhu.edu/advise.html>. The manual outlines the course requirements for our majors and concentrations.
- **READ THE UNIVERSITY UNDERGRADUATE STUDENT HANDBOOK and COURSE CATALOG:** This handbook, available at <http://web.jhu.edu/registrar/catalog> is given to each student in their freshman year and are expected to read and become familiar with its contents. It describes university-level policies in all areas of academics, such as general degree requirements, grading policies, sources of credit, and ethics.
- **MECHANICAL ENGINEERING'S SECTION OF THE COURSE CATALOG:** Visit <http://e-catalog.jhu.edu/departments-program-requirements-and-courses/engineering/mechanical-engineering/> for the Mechanical Engineering section.
- **USE THE UNDERGRADUATE ADVISING CHECKLIST:** the Whiting School provides a laminated green checklist with suggestions of questions to ask students during advising meetings.
- **KEEP IN TOUCH:** Encourage your advisees to contact you regularly, especially during Advising Week when they will be selecting their classes for the next semester. Advising Week takes place in November and April, just before the next semester's registration opens. Before each semester during Advising Week, you will release the Advisor Hold.
- **CHECKOUT SHEET:** Each semester, have your advisees complete and bring a check out sheet for their major. It will help you help them determine the next courses to take. Checkout sheets are available at <http://www.me.jhu.edu/advise.html> or in the Advising Manual. To comply with ABET requirements the Whiting School requires that advisors keep a copy of each student's updated checkout sheet every semester. This means that for most students, advisors will have eight versions by graduation.
- **LETTER GRADES:** Except for the first semester of the freshman year, all grades for courses that will count toward the degree must receive letter grades. Courses taken in the first semester of the freshman year and all Intersession courses receive only S/U grades. Because of this, Intersession courses cannot be used to meet B.S. degree requirements, unless an exception is approved by the department Chair.
- **COURSE EXCEPTION WAIVER FORMS:** Anytime that you approve a deviation of any sort from the standard degree requirements (including counting Independent Research as an elective), you must complete this form.

Note that exceptions to the Humanities and Social Science courses must be pre-approved by our department and the Whiting School Academic Advising office. Please read the Course Catalog carefully to ensure that the proposed exception is possible.

Visit http://me.jhu.edu/Course_Exception_Waiver_Form.pdf for the interactive form.

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You and the student sign the form and deliver it to the academic program administrator, who will obtain necessary signatures from the Department Chair and the Whiting School Academic Advising office. If you do not complete this form, the student will not be allowed to graduate.

- **RELEASING ADVISOR HOLDS:** There is a wealth of important information on the Advisor Screen. You will use this to release a student's Advisor Hold and access other information:
 1. Go to <https://isis.jhu.edu> (for future logins, save this to your Favorites).
 2. Enter your JHED ID and password (see below).
 3. Click on Advisor at the top of the screen.
 4. Click on Proceed to Advisee List to view your current advisees.
 - To release a hold on the advising page, click Release Hold.
 - To put the hold back on, click Apply Hold.
 5. You can click on the following links for additional student information:
 - Enrollments (add/drop activity)
 - Grades
 - Alerts/Holds

COURSE INFORMATION

- **"FRESHMAN EXPERIENCES" SUBSTITUTES:** In many cases, when a student transfers from another major to Mechanical Engineering or Engineering Mechanics, the department will accept the previous major's introduction to engineering course as a substitute. The student will need to take a comparable computing course and physics courses.

If the student does not have an acceptable introduction to engineering course, he or she will take **500.101 What is Engineering** or **530.102 Freshman Experiences II / 530.106 MechE Freshman Lab** plus accepted physics and programming course options. Consult the attached "Mechanical Engineering Freshman Courses" memorandum for details.

- **WAIVED COURSES DON'T EARN CREDITS:** Depending on the success of a student's Freshman Math Placement tests, which are taken the summer before matriculation, he or she may be waived from taking Calculus I and sometimes additional math courses. A student might begin the math sequence at Calculus II or higher. No academic credit is given for waived courses. Students must still earn the total number of credits in the curriculum (e.g. 19 Math credits for a Mechanical Engineering major), regardless of class level begun.
- **PHYSICS:** Students earning AP Physics C credits are exempt from taking the equivalent physics courses. AP Physics C (mechanics) exempts students from taking 530.103/.104 Intro to Mechanics I/II or 171.101 Physics I. AP Physics C (electricity and magnetism) exempts students from taking 171.102 Physics II.

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PHYSICS LABS MUST BE TAKEN EVEN WITH AP CREDIT

While the University does not require Physics labs, departments can require them, which Mechanical Engineering does. The students' ISIS records and transcripts will show a waiver of the labs, which is confusing. Impress upon your AP Physics C-accredited advisees that they must take the labs.

- All students must take either the Mechanical Engineering Freshman Lab I and II (530.105/.106) or Physics Lab I (173.111) as appropriate to the freshman introductory course track one is taking.
 - Also, the Physics Lab II (173.112) laboratory course is required for all students.
- **WRITING:** Please note in Section 5.3 the advising manual the Writing requirement and courses to be taken to meet it, as well as Distribution and Depth requirements for the Humanities and Social Science requirements.
 - 060.113 or 060.114 Expository Writing and 220.105 Introduction to Fiction and Poetry are the approved courses for our majors.
 - You must approve students requesting other writing courses to be counted, and a Course Exception Waiver form must be completed.
 - Students need take only one Writing intensive course, as 530.403 and 530.404 Senior Design count as the other Writing course.
 - **WHO CAN TEACH "H" and "S" COURSES?** Mechanical Engineering majors may count one course that is taught in the Whiting School with an H and/or S designation towards the Distribution and Depth requirement. The accounting courses, 660.203 and 660.204, may not count towards this requirement. The philosophy behind these limitations is that H&S courses should be taught or supervised by fulltime faculty in the Krieger School.
 - **LINEAR ALGEBRA and DIFFERENTIAL EQUATIONS OPTIONS:** Students are encouraged to take 110.302 Differential Equations and 110.201 Linear Algebra instead of the combined 550.291 L.A. /D.E. course if they can work the additional four credits into their schedule. An advantage of taking the courses separately is that 110.302 Differential Equations can be counted as a Technical Elective.
 - **ENGINEERING BUSINESS and MANAGEMENT OPTIONS:** Students must take 660.461 Engineering Business and Management...or...both 551.105 Introduction to Business and Management and 551.341 Business Process and Quality Management.
 - **ROBOTICS MINOR:** The Laboratory for Computational Sensing and Robotics (LCSR) has created the Robotics minor, with several course tracks including one for Mechanical Engineering majors. See https://www.lcsr.jhu.edu/Robotics_Minor.

Theoretically, students can complete the minor with every course counting toward a MechE B.S. degree requirement, mainly through electives. But one required minor course, 520.353 Control Systems has a prerequisite 520.214 Signals and Systems, which would not count toward the MechE B.S. degree.

The ECE department is willing to waive this prerequisite for MechE students if they can demonstrate to the instructor that they have the necessary knowledge to take Control Systems without the prerequisite. Otherwise, students will have to take the extra 520.214 course.

- **PEABODY STUDENTS** – Please ask if your advisees are working toward a minor or major at the Peabody School of Music in addition to Mechanical Engineering. Be sure that those students are

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aware of all course requirements for both programs. Be particularly aware of Peabody courses that count for H and S designations and those that do not. The Whiting School will not allow students to count Peabody courses for H and S requirements that don't have those designations.

- **INDEPENDENT RESEARCH and INDEPENDENT STUDY:** Students may wish to explore topics only partially covered or not covered at all in coursework, and others may wish to expand their learning on a course topic. Independent Research is a course under the direct supervision of a faculty member in which a student identifies and proposes research work. Independent Study is the result of creating literally a course of study that is focused on topics not covered in current courses or is an expansion of one topic in which further study is desired.
 - Up to three credits can be earned in any one semester, summer, or intersession, though only up to three credits of independent work can be counted toward the B.S. Mechanical Engineering degree as an elective.
 - Each credit should reflect 40 hours of work, which is unpaid.
 - No distribution credits are attached to independent work, though your advisor can designate a distribution through a Course Exception Waiver form at http://www.me.jhu.edu/Course_Exception_Waiver_Form.pdf.

The Mechanical Engineering department recommends that a student have a cumulative GPA of at least 3.0 to request approval to conduct independent research or independent study.

Before embarking on a project, students must obtain pre-approval from their academic advisors by presenting a completed "Undergraduate Research, Independent Study, Internship, and Departmental Thesis" form available at the Registrar or from the Academic Program Administrator. Any research work performed without this preapproval will not be recognized and accredited.

- **FERPA** – The University expects everyone to follow its policy based on the Family Educational Rights and Privacy Act of 1974. This federal law restricts what information – particularly student grades – that can be released without a student's written consent. Please read and keep handy the FERPA document at <http://web.jhu.edu/registrar/FERPA>.
- **MCAT** – In rare instances, a Mechanical Engineering or Engineering Mechanics major will also follow a pre-med track and will take the MCAT for medical school applications. While the JHU Office of Pre-Professional Studies will advise the pre-med portion, keep in mind that there are changes in the MCAT and its testing. There will be a stronger focus on psychology and sociology than before, as well as focus on living systems, critical analysis and reasoning skills. Be sure to keep this in mind as students select H/S courses. Visit this page for additional details: <http://web.jhu.edu/prepro/Forms/New%20Content%202015%20MCAT.docx>.

NEED HELP? If you have advising questions, please consult with a senior faculty member or the academic program administrator.

Mechanical Engineering Freshman Courses

Information and Guidelines for Advisors

(revised December 11, 2014)

The Courses

In 2007, the JHU Mechanical Engineering Department embarked on an ambitious and novel project to re-design the freshman curriculum as a highly integrated physics and mechanical engineering sequence. For logistical purposes, the sequence is divided into three yearlong components with a total of 10 credits:

530.101/102 (E) Freshman Experiences in Mechanical Engineering I and II

This course is an overview of the field of mechanical engineering along with topics that will be important throughout the mechanical engineering program. This one-year course includes applications of mechanics, elementary numerical analysis, programming in Matlab, use of computer in data acquisition, analysis, design, and visualization, technical drawing, the design process and creativity, report preparation, teamwork, and engineering ethics. Co-requisites are 530.103/104 and 530.105/106, and 110.109 (for spring).

- 2 credits each semester, offered yearly
- Replaces: parts of the previous Freshman Experiences in Mechanical Engineering course (formerly 530.101) and the Mechanical Engineering Computing course (formerly 530.106)

530.103/104 (E) Introduction to Mechanics I and II

A one-year course offering in-depth study of elements of mechanics, including linear statics and dynamics, rotational statics and dynamics, thermodynamics, fluids, continuum mechanics, transport, oscillations, and waves. This is an alternative to 171.101, offered only to Mechanical Engineers and Engineering Mechanics students taking 530.101/102 concurrently. Co-requisites are 530.101/102, 530.105/106 (laboratory), and 110.108/109 (Calculus).

- 2 credits each semester offered yearly
- Replaces: General Physics for Physical Science Majors I (171.101) and portions of the previous Freshman Experiences in Mechanical Engineering course (formerly 530.101)

530.105/106 (E) Mechanical Engineering Freshman Laboratory I and II

Hands on laboratory complementing 530.101/102 and 530.103/104, including experiments, mechanical dissections, and design experiences distributed throughout the year. Experiments are designed to give students background in experimental techniques as well as to reinforce physical principles. Mechanical dissections connect physical principles to practical engineering applications. Design projects allow students to synthesize working systems by combining mechanics knowledge and practical engineering skills. Co-requisites are 530.101/102 and 530.103/104.

- 1 credit each semester offered yearly
- Replaces: General Physics Laboratory (173.111) and portions of the previous Freshman Experiences in Mechanical Engineering course (formerly 530.101)

Motivation and Support

The motivation for this new curriculum is to address several perceived problems with existing freshman courses:

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1. Lack of intuitive connections between physics, math, and engineering, which may lead freshmen to discount the value of basic science and math knowledge. ME faculty find that they must re-teach basic science principles in upper-level engineering courses.
2. Heavy emphasis of Physics I on particle dynamics, with relatively little coverage of solid mechanics, energy methods, and other topics essential to mechanical engineering students.
3. Large class size of basic science and math classes, which can alienate some freshman and may lead to poorer student retention.

While the new courses will not solve all of these problems for every freshman course (i.e., we are not integrating Calculus or Physics II), we feel that it is a step in the right direction and look forward to objectively evaluating the results of the new curriculum.

Profs. Allison Okamura and Bill Sharpe will be teaching the courses, and Allison Okamura is the leader in the course planning/development. This plan was formulated based on recommendations from the ME Curriculum Committee (Sharpe, Prof. Joseph Katz, and Prof. Ilene Busch-Vishniac), as well as Lester Su, who is the ME representative on the WSE Physics Committee. The Mechanical Engineering department is strongly behind this project; the Department Chair committed \$25,000 to course development in the first year, as well as a 1-course teaching release for Okamura in the Spring 2007 semester. The WSE Kenan Teaching Fund is providing an additional \$5,000 to support lab development.

The new freshman curriculum is novel (similar but not exactly like some courses developed at other institutions), and the course development is informed by personal guidance and published results in the engineering education literature from engineering education experts such as Busch-Vishniac at JHU (now at McMaster University) and Prof. Sheri Sheppard at Stanford University.

In addition, we have consulted with Prof. Morris Swartz of the JHU Department of Physics and Astronomy on the design of the mechanics portion of the course. He has been supportive of this initiative. Our approach, if successful, could become a model for engineering departments at JHU and nationally.

Guidelines for Freshman Advisors

If you are advising freshman or students transferring to Mechanical Engineering, please read this section carefully.

Co-requisites

If a student has not already taken or tested out of Calculus I, he or she must take it concurrently with 530.103 Introduction to Mechanics I. Introduction to Mechanics will include calculus-based physics, but will start with algebra-based physics for the first several weeks to allow students who are taking Calculus I concurrently to receive the necessary math training before starting to apply derivatives and integrals to mechanics problems.

Advanced Placement credits

If a student scores a 4 or 5 on the Physics C (first part), he or she can receive 4 credits and does not need to take Introduction to Mechanics (530.103/104). However, the student must still take the other two courses (Freshman Experiences and Lab).

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Introduction to Engineering Alternatives

It is recommended that only Mechanical Engineering or Engineering Mechanics students who are committed to their major take the new course sequence. Beginning in Spring 2015, there will be two alternative course sequences that will be accepted by the Mechanical Engineering Department:

PREFERRED ALTERNATIVE

- Introduction to Engineering
 - 530.102 Freshman Experiences in Mechanical Engineering II (2 credits, Spring)
 - 530.106 Mechanical Engineering Freshman Laboratory II (1 credit, Spring)
 - Interession of the Freshman Year (0-1 credit)
 - Either 550.282 A Hands-On Introduction to Matlab, or...
 - A self-study of Matlab using the text, "MATLAB: An Introduction with Applications," by Amos Gilot
- Introduction to Computing: Any one of these courses (3 credits):
 - 500.200 Computing for Engineers and Scientists (Fall)
 - 510.202 Computation and Programming for Materials Scientists and Engineers (Spring)
 - 560.220 Civil Engineering Analysis (Fall)
 - 580.200 Intro to Scientific Computing (Spring)
 - 600.112 Intro to Programming for Scientists and Engineers (Fall)
 - 600.107 Intro to Java (all semesters)*
- Introduction to Physics
 - 171.101 or 171.107 General Physics for Physical Science Majors I (4 credits)
 - 173.111 General Physics Laboratory (1 credit)

ACCEPTABLE ALTERNATIVE

- Introduction to Engineering
 - 500.101 What is Engineering? (3 credits, Fall)
- Introduction to Computing: Any one of these courses (3 credits):
 - 500.200 Computing for Engineers and Scientists (Fall)
 - 510.202 Computation and Programming for Materials Scientists and Engineers (Spring)
 - 560.220 Civil Engineering Analysis (Fall)
 - 580.200 Intro to Scientific Computing (Spring)
 - 600.112 Intro to Programming for Scientists and Engineers (Fall)
 - 600.107 Intro to Java (all semesters)*
- Introduction to Physics
 - 171.101 or 171.107 General Physics for Physical Science Majors I (4 credits)
 - 173.111 General Physics Laboratory (1 credit)

* - 600.107 Intro to Java is an acceptable programming course, but because no Matlab is taught, it is considered a "last resort" when a student is unable to schedule and complete one of the other preferred computing courses.

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Note that these alternatives have 11-12 credits, one or two more than the number of credits offered by the primary set of introductory courses.

Reasons for taking the alternative sequence include: possible double major that would require Physics I and Physics I Lab, possible change of major to a new major that would require Physics I and Physics I Lab, and students with an interest in taking advanced physics courses that would require Physics I and Physics I Lab.

Relationship to Physics courses

If a student is taking 171.101 General Physics for Physical Science Majors I and 173.111 General Physics Laboratory, but still wants to take the courses 530.101/102 Freshman Experiences in Mechanical Engineering I and II (instead of the course 500.101 What is Engineering?), the student must still take 530.105/106 Mechanical Engineering Freshman Laboratory I and II. This is despite the fact that there may be some overlap between the physics lab and the ME lab.

Students with a score of 4 or 5 on AP Physics C Mechanics will be exempt from 530.103/104 Intro to Mechanics I and II. However, the corresponding labs course, 530.105/106 Mechanical Engineering Freshman Laboratory I and II is still required.

For students wishing to take 171.102 General Physics for Physical Science Majors II in the spring of their freshman year, 530.101 Freshman Experiences in Mechanical Engineering I has been designed to the topics needed to prepare the students for Physics II (primarily, oscillations and waves). These students would effectively be taking 1.5 physics courses in the spring of their freshman year, which is a heavy load. Note that students starting with either Calculus I or II can take Physics II in the spring under the new course set, but it is not necessary – Physics II can be taken in fall of the sophomore year.

Sample Schedules

Starting with Calculus I:

Fall – 15 credits

110.108 Calculus I (4)
510.101 Intro to Materials Chemistry (3)
530.101 Freshman Experiences I (2)
530.103 Intro to Mechanics I (2)
530.105 MechE Freshman Lab I (1)
H/S Elective (3)

Spring – 15 credits

110.109 Calculus II (4)
530.102 Freshman Experiences II (2)
530.104 Intro to Mechanics II (2)
530.106 MechE Freshman Lab II (1)
H/S Elective (3)
H/S Elective (3)

Starting with Calculus II:

Fall – 15 credits

110.109 Calculus II (4)
510.101 Intro to Materials Chemistry (3)
530.101 Freshman Experiences I (2)
530.103 Intro to Mechanics I (2)
530.105 MechE Freshman Lab I (1)
H/S Elective (3)

Spring – 14-17 credits

110.201 Calculus III (4)
530.102 Freshman Experiences II (2)
530.104 Intro to Mechanics II (2)
530.106 MechE Freshman Lab II (1)
171.102 General Physics II (4)
173.112 General Physics Lab II (1)
(Optional) H/S Elective (3)

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Starting with Calculus II and who have AP Physics C - Mechanics credit

Fall – 16 credits

110.109 Calculus II (4)
510.101 Intro to Materials Chemistry (3)
530.101 Freshman Experiences I (2)
530.105 MechE Freshman Lab I (1)
H/S Elective (3)
H/S Elective (3)

Spring – 15 credits

110.201 Calculus III (4)
530.102 Freshman Experiences II (2)
530.106 MechE Freshman Lab II (1)
171.102 General Physics II (4)
173.112 General Physics Lab II (1)
H/S Elective (3)