

PRE-ENGINEERING AND ENGINEERING PROGRAMS

Engineering professions include a variety of fields such as electrical, computer, mechanical, civil, mining, architectural, biomedical, environmental, industrial, chemical, geological, materials science, manufacturing, and nuclear.

Engineering Education:

- Two years of liberal arts (pre-engineering) courses to include calculus, physics, chemistry, English, economics and, in some cases, speech
- Two to three years of engineering course work

Engineering programs in Wisconsin include:

University of Wisconsin Madison
www.engr.wisc.edu
University of Wisconsin Milwaukee
www.uwm.edu/ceas/
University of Wisconsin Platteville
www.uwplatt.edu

University of Wisconsin Stout
www.stout.edu
Marquette University
www.eng.mu.edu
Milwaukee School of Engineering
www.msoe.edu

COURSE SUGGESTIONS FOR STUDENTS ATTENDING UW ENGINEERING SCHOOLS:

Required courses will vary depending on the school and engineering specialty selected. It is important that pre-engineering students meet regularly with pre-engineering advisors, and that they contact the school where they plan to complete the engineering program early in their college careers. The following first semester courses are suggested, with exceptions to this schedule noted below. If you are not in one of these classes your advisor should know the reason why!

Chemistry 105 – General Chemistry I	5 credits
Math 171 – Calculus I (or begin the math sequence depending on placement test results)	4 credits*
Practical Art 101 – Elements of Descriptive Geometry (See exceptions below)	3 credits**
Computer Science 221 – OO Design & Programming I	3 credits

* Start math sequence according to placement results. Note that lower placement will delay taking 109 General Physics I, which is calculus based; if placed into math 104 or 108, it is best to take 108 or take 104 in fall term and math 106 in January interim ($104 + 106 = 108$) to progress through the math sequence more quickly.

** Practical Art 101 is required for all engineering programs at UW Platteville; industrial, civil and mechanical at UW Milwaukee; and agricultural, mechanical and engineering mechanics at UW Madison. **DO NOT TAKE** Practical Art 101 for electrical or materials engineering at Milwaukee or for electrical, materials, chemical, civil, geological, industrial, metallurgical, and nuclear at Madison. Instead substitute a social science or humanities elective. Economics (micro) 206 would be a good choice.

Of the four courses listed computer science 221 may be most conveniently delayed and taken later so, if students wish, they may substitute a social science, humanities or English composition course (101).

TBIS 188 (3 credits) is required by both Platteville and Milwaukee, and students attending Madison must have taken it or tested out of it. Speech 111 (3 credits) is appropriate for all engineers attending UW Platteville but only for electrical, civil and chemical engineers at UW Madison. It does not meet any requirement for other engineering specialties at Madison and is not needed for engineering at Milwaukee.

Faculty advisors: Dr. Dennis Rioux (424-4429) (Halsey 347) Physics Dept. all areas of engineering.

Email: rioux@uwosh.edu

Dr. Sandra Neuendorf (424-7101) (Halsey 442) Chemistry Dept. questions concerning chemical engineering Email:

neuendorf@uwosh.edu

Academic advisors: Ron Cardo (Dempsey 130)

Email: cardo@uwosh.edu

SAMPLE SCHEDULES FOR UW OSHKOSH STUDENTS IN PRE-ENGINEERING

Mechanical Engineering is the branch of engineering that deals with the design, construction and operation of machinery.

Exact courses are dependent on the engineering specialty and the university the student plans to attend later.

Intended Mechanical Engineer

Fall Freshman Year

Phys/Astr 109–General Physics I	5 cr.
Math 171–Calculus I	4 cr.
Prac Arts 101–El. Of Desc. Geometry	3 cr.
Comp Sci 221–OO Design & Prog	<u>3 cr.</u>
	15 cr.

Fall Interim – Liberal elective such as Econ 204

Spring Freshman Year

Math 172-Calculus II	4 cr.
Prac Arts 102-Eng Drawing and Design	3 cr.
Phys/Astr 110-General Physics II	5 cr.
TBIS 188-Theme Based Inquiry Seminar	<u>3 cr</u>
	15cr

Spring Interim – Liberal elective such as Psych 101-General Psychology (3 cr.)

Fall Sophomore Year

Math 273-Calculus III	4 cr.
Phys/Astr 206-Modern Physics	4 cr.
Phys/Astr 201- Statics	3cr.
Chemistry 105	5cr.
	16cr.

Fall and Spring Interim: Liberal electives such as Economics 206, Music 219-Music Appreciation or Phil 109-Introduction to Philosophy.

Students who are working part-time or choose to take a lighter load in the freshman year would probably take Computer Science 221-OO Design & Programming and TBIS 188 later.

Spring Sophomore Year

Math 301-Intro to Probability & Statistics	3 cr.
Math 371-Differential Equations	3 cr.
Phys/Astr 202-Dynamics	2 cr.
Chemistry 106	5cr.
General Elective	3 cr.
	16 cr.

The liberal electives listed, two from social science and two from humanities, are typical examples. Most engineering programs require 16-18 credits of liberal electives roughly split between social sciences and humanities.

Intended Chemical Engineer

Chemical Engineering is the branch of engineering that deals with design, construction and operation of plants and machinery for making such products as acids, dyes, drugs, plastics, and synthetics. The activity of applying chemistry to the solution of practical problems.

Fall Freshman Year

Chem 105-General Chemistry I	5 cr.
Math 171-Calculus I	4 cr.
Comp Sci 221-OO Design & Prog I	<u>3 cr.</u>
	12 cr.

Spring Freshman Year

Chem 106-General Chemistry II	5 cr.
TBIS 188-Theme Based Inquiry Seminar	3 cr.
Math 172-Calculus II	<u>4 cr.</u>
	12 cr.

Fall and Spring Interim: Liberal electives such as Econ 206-Principles of Economics I-Micro (3 cr.) or Psych 101-General Psychology (3 cr.).

Fall Sophomore Year

Phys/Astr 109-General Physics I	5 cr.
Chem 235-Organic Chemistry I	4 cr.
Math 273-Calculus III	<u>4 cr.</u>
	13 cr.

Spring Sophomore Year

Phys/Astr 110-General Physics II	5 cr.
Chem 335-Organic Chemistry II	4 cr.
Chem 221-Quantitative Analysis	<u>5 cr.</u>
	14 cr.

Fall and Spring Interim: Liberal Electives such as Music 219 Music Appreciation and Phil 109 Introduction to Philosophy.

The liberal electives listed, two from social science and two from humanities, are typical examples. Most engineering programs require 16-18 credits of liberal electives roughly split between social sciences and humanities.

Electrical Engineering

Electrical engineering is the branch of engineering science that studies the uses of electricity and the equipment for power generation and distribution and the control of machines and communication.

Fall Freshman Year

Math 171 Calculus I	4 cr.
Phys/Astr 109 General Physics I	5 cr.
Comp Sci 221 Computer Science	3 cr.
Econ 206 Micro Economics	<u>3 cr.</u>
	15 cr.

Spring Freshman Year

Math 172 Calculus II	4 cr.
Phys/Astr 110 Gen. Physics II	5 cr.
TBIS 188 Theme Based Inquiry Seminar	3 cr.
Electives	<u>3-6 cr.</u>
	15-18 cr.

Fall and Spring Interim: Liberal electives such as Econ 206-Principles of Economics I-Micro (3 cr.) or Psych 101-General Psychology (3 cr.).

Fall Sophomore Year

Math 273 Calculus III	4 cr.
Phys/Astr 206 Modern Physics	4 cr.
Math 256 Intro to Linear Math	3 cr.
Electives	<u>3-6 cr.</u>
	14-17 cr.

Spring Sophomore Year

Math 371 Diff. Equations	3 cr.
Chem 105 Gen. Chem. I	5 cr.
355 Num. Analysis	3 cr.
Electives	<u>3-6 cr.</u>
	14-17 cr.

Fall and Spring Interim: Liberal Electives such as Music 219 Music Appreciation and Phil 109 Introduction to Philosophy.

Students who are working part-time or choose to take a lighter load in the freshman year would probably take Comp Sci 221 Programming in Java and TBIS 188 Theme Based Inquiry Seminar later.

The liberal electives listed, two from social science and two from humanities, are typical examples. Most engineering programs require 16-18 credits of liberal electives roughly split between social sciences and humanities.

Intended Civil Engineer

The branch of engineering concerned with the design and construction of structures and altering geography to suit human needs. It focuses on bridges and altering geography to suit human needs. It focuses on bridges, roads and dams.

Fall Freshman Year

Phys/Astr 109 General Physics I	5 cr.
Math 171 Calculus I	4 cr.
Prac Arts 101 Elements of Desc. Geometry	3 cr.
One Elective from:	<u>4 cr.</u>
Geology 102 Physical Geology	
Geology 150 Environmental Geology	
Biology 105 Biological Concepts	
TOTAL	16 cr.

Spring Freshman Year

Math 172 Calculus II	4 cr.
Phys/Astr 110 General Physics II	5 cr.
TBIS 188 Theme Based Inquiry Seminar	3 cr.
Biol/Zool or Geology Elective	<u>4 cr.</u>
TOTAL	16 cr.

Fall Interim Liberal Elective such as Econ 206 Principles of Economics I Micro 3 cr.

Spring Interim Liberal Elective such as Psych 101 General Psychology 3 cr.

Fall Sophomore Year

Math 273 Calculus III	4 cr.
Phys/Astr 201 Statics	3 cr.
Chem 105 General Chemistry I	5 cr.
General Elective	<u>3 cr.</u>
TOTAL	15 cr.

Spring Sophomore Year

Math 301 Intro to Probability and Statistics	3 cr.
Math 371 Differential Equations	3 cr.
Phys/Astr 202 Dynamics	3 cr.
Chem 106 General Chemistry II	<u>5 cr.</u>
TOTAL	14 cr.

Fall and Spring interim: Liberal Electives such as Music 219 Music Appreciation and Phil 109 Intro to Philosophy

Students who are working part-time or choose to take a lighter load in the freshman year would probably take Comp Sci 221 Programming in Java and TBIS 188 later.

The liberal electives listed, two from social science and two from humanities, are typical examples. Most engineering programs require 16-18 credits of liberal electives roughly split between social sciences and humanities.

*Civil Engineering students will need geology elective and a botany or zoology elective. Geol 102 Physical Geology or Geol 150 Environmental Geology can serve as the geology electives roughly split between social sciences and humanities.

Physics/Engineering Dual Degree Program

The information below delineates the required courses needed to complete physics major at UW Oshkosh, transfer to either UW Madison or the University of Minnesota, and complete two-year engineering major. (*Students in the dual degree program receive both a Bachelor of Science degree with a major in physics from UW Oshkosh and a Bachelor of Science degree with a major in a selected engineering field from UW Madison or the University of Minnesota.*)

Degree Requirements: UW Oshkosh

1. Students must meet the course requirements for general education and for a B.S. degree in the college of Letters and Science.
2. Meet the grade point average requirements of UW Oshkosh with regard to general education courses and courses taken in physics at UW Oshkosh.
3. Meet the UW Oshkosh requirement for 35 upper level course credits. (Courses designated as upper level by the engineering school to which the student has transferred will be included in the upper level credit count to meet the UW Oshkosh requirement.)
4. Normally, students will complete about 84 credits at UW Oshkosh before transferring to their engineering school of choice. If a student transfers courses into UW Oshkosh, the student will be required to complete 30 credits of UW Oshkosh courses to qualify for the B.S. Degree with a major in physics from UW Oshkosh.
5. The UW Oshkosh residency requirement stating that 15 of the student's last 30 credits must be taken at UW Oshkosh will be waived for these students.

Additional explanation: Completion of the program will normally take five years (or more), three at UW Oshkosh to complete the physics major and College of Letters and Science Bachelor of Science requirements and an additional two at the engineering school of choice to complete the requirements for the degree in engineering.

UW Oshkosh requirements for the physics major:

Mathematics Courses:

Math 171 Calculus I	4 cr.
Math 172 Calculus II	4 cr.
Math 273 Calculus III	4 cr.
Math 256 Intro to Linear Math	
AND	
Math 371 Differential Equations	6 cr.

OR Combined Linear Algebra/Differential Equations course from the destination engineering school

Total Math credits required (from UW Oshkosh or equivalent), including 3 to 5 courses listed above: 12 – 18 cr.

Chemistry 105 General Chemistry I 5 cr.

Total Chemistry credits required: 5 cr.

Required Physics courses:

Physics 109 General Physics I 5 cr.

Physics 110 General Physics II 5 cr.

Physics 206 Modern Physics 4 cr

Physics 222 2 cr..

Physics 320 Classical Physics* 3 cr.

*(OR Physics 201 Statics And Physics 202 Dynamics) 6 cr.

*Statics and Dynamics may be taken at the destination engineering school.

Additional UW Oshkosh physics courses (total 11 credits) from the following list:

Physics 305 Electronic Circuits and Devices 3 cr.

Physics 311 Digital Instrumentation 4 cr.

Physics 307 Optics 3 cr

Physics 319 Digital Signal Processing. 3 cr.

Physics 322 Physics Laboratory II 2 cr.

Physics 408 Statistical Physics and Thermodynamics 3 cr.

Physics 417 Electricity and Magnetism 3 cr.

Physics 419 Quantum Mechanics 3 cr.

Physics 491 Senior Research Project 1-4 cr.

Total minimum Physics and Engineering credits from UW Oshkosh, as stated above: 26 cr.

Courses required from UW Oshkosh: Minimum of 30 cr.

Within the course credits transferred back from the destination engineering school to UW Oshkosh, there must be:

- a) Sufficient approved upper division engineering and physics courses for the student to have at least 36 credits in physics and engineering courses including the minimum 26 UW Oshkosh physics and engineering credits listed above.
- b) Sufficient credits to meet the required total of 120 credits and the 35 upper division credits required for graduation at UW Oshkosh.

The B.S. Degree with Physics Major will be awarded as soon as the student has transferred the needed courses from the destination engineering school and has met the

requirements for a B.S. degree from UW Oshkosh and the requirements for the Physics Major specified above.