Effective Fall 2017

ENGINEERING PHYSICS
Chair: Andrew Pawl
Office: Engineering Hall 228
Department Telephone: (608) 342-1651

### FIRST YEAR

<table>
<thead>
<tr>
<th>Dept.</th>
<th>No.</th>
<th>Course</th>
<th>Credits</th>
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<tr>
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TOTAL CREDITS: 121
WHAT IS ENGINEERING PHYSICS?

There are about 50 undergraduate Engineering Physics (or EP) programs in the U.S. dating back to ~1930. Unlike most other engineering disciplines, EP programs around the country can vary a great deal. So, the answer to the question, "What is Engineering Physics?", depends on the school. The EP program at UWP is a hybrid of applied physics, electrical engineering (EE), and mechanical engineering (ME). Significantly, at UWP it is an accredited engineering degree, not a physics or science degree.

The Engineering Physics curriculum provides students with a fundamental knowledge of physics, the application of physics to engineering problem solving, including design, introductory courses in mechanical and electrical engineering, and lastly, a significant professional engineering concentration tailored to suit the individual's particular interest.

The program is designed to address the needs of students seeking innovative careers in areas where multiple engineering disciplines merge (e.g. electro-mechanical industries), or nontraditional engineering disciplines, as well as high-tech industries. The EP program is also structured for those students who have an interest in the physical sciences as well as engineering.

The majority of graduates of the EP program have entered industry in such diverse areas as mechanical controls, digital and analog electronics, nuclear instrumentation, software development, manufacturing quality control, and building acoustics. Others have chosen to attend graduate school in either engineering or physics programs.

The details of the curriculum are discussed throughout this document, but essentially consist of four core areas: electrical engineering, mechanical engineering, engineering physics, and a professional engineering concentration of your choice. The first two prepare the student to pursue any of the many specific areas of electrical or mechanical engineering (e.g. electronics or thermo-fluid systems). These two core areas provide the necessary prerequisite course work. The engineering physics core consists of several applied physics courses that span most of what would be considered traditional physics topics, but with an emphasis on engineering applications and design. This core also includes significant laboratory experiences including specialized courses in sensors and modeling of physical systems as well as a senior design capstone course where students work in teams on an industry sponsored (real-world) engineering problem. The final component is the professional engineering concentration. While students are free to design their own concentration, most students follow one of the following preconfigured concentrations: (1) controls, (2) electronics/digital, (3) electric power, (4) materials, (5) mechanical design, or (6) thermo-fluid systems.

A brief list of companies who have hired graduates of this EP program includes: John Deere, Caterpillar, Cutler Hammer, Sundstrand, Cummins, IBM, Oshkosh Truck, ASI, Honeywell, Rockwell Collins, Pella, LASX, McCain Foods, Lockheed Martin, MPC, Plexus, and Transocean. Typical salaries upon graduation have been commensurate with graduates of electrical and mechanical engineering.

Engineering Physics is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC/ABET).
PROFESSIONAL ENGINEERING ELECTIVES

15/16 credits are required depending on whether you take GE2340 (4 cr) or GE/ME2630 (3 cr). One of these electives must be 4000 level.

On the following page are possible Electrical and Mechanical Engineering concentrations.

A concentration is not required; these are merely suggestions!

Nearly all 3000/4000 level Electrical and Mechanical Engineering courses are acceptable as Professional Engineering Electives, however three ME courses have sufficient overlap with an EP course so are not advised. Those courses are ME3430, ME4720, and ME4830. Communicate with your advisor if you would like to elect one of these courses. Other courses, including ME4930 and the EE and ME co-op/intern courses, require department approval. EP has equivalent courses. IE4730 and EE3210 can be used for the ‘Math Elective’ in which case cannot double-count as a Professional Engineering Elective. Lastly, be aware that COSC1430 is accepted in place of ME3430.

In addition to the EE/ME courses, the following courses are acceptable electives:

OTHER PROFESSIONAL ENGINEERING ELECTIVES*

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<tr>
<th>Course</th>
<th>Description</th>
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<tr>
<td>EP4980</td>
<td>Special Topics in Engineering Physics</td>
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<tr>
<td>EP4990</td>
<td>Independent Study (max 2 total credits)</td>
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<tr>
<td>MSNT3940</td>
<td>Nanotechnology Principles &amp; Applications</td>
</tr>
<tr>
<td>MSNT4230</td>
<td>Design, Characterization, &amp; Simu of MEMS</td>
</tr>
<tr>
<td>SE3430</td>
<td>Object Oriented Analysis &amp; Design</td>
</tr>
<tr>
<td>SE4130</td>
<td>Real Time Embedded Systems</td>
</tr>
<tr>
<td>IE4430</td>
<td>Quality Engineering</td>
</tr>
<tr>
<td>IE4730</td>
<td>Engineering Management</td>
</tr>
<tr>
<td>IE4630</td>
<td>Manufacturing Systems Design</td>
</tr>
<tr>
<td>IE4830</td>
<td>Engineering Continuous Improvement</td>
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*courses not listed require departmental approval

Below are courses which satisfy the elective under “Other Courses”. Note: IE4730 counts as either this elective or a professional engineering elective, but not both. EE3210 only counts as this elective, not a professional engineering elective.

<table>
<thead>
<tr>
<th>Other Courses</th>
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<tbody>
<tr>
<td>Math Elective</td>
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<tr>
<td>MATH 3230 Linear Algebra</td>
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<tr>
<td>MATH 3730 Numerical Analysis</td>
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<td>MATH 3830 Differential Equations II</td>
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<td>MATH 4030 Statistical Methods with Applications</td>
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<tr>
<td>MATH 4430 Advanced Calculus</td>
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<tr>
<td>MATH 4530 Complex Variables</td>
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<td>OR</td>
</tr>
<tr>
<td>IE 4730 Engineering Management</td>
</tr>
<tr>
<td>EE 3210 Engineering Computation</td>
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Academic Standards
An average G.P.A. > 2.00 is required for required and elective engineering courses numbered 3000 or above.

A “C-” or better is required in the following required courses in the engineering physics curriculum:
MATH 2640, 2740, 2840, 3630, PHYSICS 2240, 2340, 3140, ENGRPHYS 4010, 4930, ELECTENG 1210, 2210, 2220, GENENG 2130, and COSC 1430.

Only one D/D+ in an ENGRPHYS course may be counted toward graduation. This includes EP4990.

Admission Requirements
Complete core courses ENGL 1130, CHEM 1450, GENENG 1030, 2030, and MATH 2640, 2740 with minimum CGPA 2.40 and C- or better in MATH 2640 and 2740.
Electrical and Mechanical Engineering Concentrations

Most of the concentrations lists more courses than the required 15/16 credits. One course must be 4000 level. If a course is indented than the first previous un-indented course is the prerequisite. For example: ME3040 is a prerequisite for ME3330 but not ME4840. ME3330 is the prerequisite for both ME4740 & ME4800. EE2210/2220, Physics II, and EP3240 are required courses for the major.

<table>
<thead>
<tr>
<th>ME - Materials Science Engineering</th>
<th>EE – Electronics/Digital Systems</th>
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<tr>
<td>- take GE2340, Mechanics of Materials</td>
<td>- recommend GE2630, Thermoscience</td>
</tr>
<tr>
<td>ME3040, Engineering Materials</td>
<td>EE2210, Circuits II</td>
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<tr>
<td>ME3230, Manufacturing Processes</td>
<td>EE3020, Analog Electronics</td>
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<tr>
<td>ME3330, Design of Machine Elements</td>
<td>EE3130, Solid State Electronic Devices</td>
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<tr>
<td>ME4440, Failure of Materials</td>
<td>EE4050\textsuperscript{c}, Advanced Analog Electronics Circuits</td>
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<tr>
<td>ME4430, Advanced Materials</td>
<td>EE3410, Electric Power Engineering</td>
</tr>
<tr>
<td>MSNT3940, Nanotechnology Principles &amp; Appl</td>
<td>EE4430\textsuperscript{d}, Power Electronics &amp; Elec Machines</td>
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<th>ME - Mechanisms, Machines, and Systems</th>
<th>EE - Control Systems</th>
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<td>ME3040, Engineering Materials</td>
<td>EE2210, Circuits II</td>
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<td>ME3330, Design of Machine Elements</td>
<td>EE3020, Analog Electronics</td>
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<tr>
<td>ME4740, Mechanical system Design</td>
<td>EE4750\textsuperscript{c}, Advanced Digital Design</td>
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<td>ME4800, Finite Element Method (\text{\textsuperscript{e}}) also requires EP3640, C: EE3130</td>
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<th>ME4840, Vibration System Design</th>
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<th>ME - Thermo-Fluid and Energy Systems</th>
<th>EE - Power Systems</th>
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<th>EE4430\textsuperscript{g}, Power Electronics &amp; Electrical Machines</th>
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\(\text{\textsuperscript{a}}\) also requires EE2220, 3020, 3770
## ENGINEERING PHYSICS (121 Credits)

Name: ______________________________________________________________      Date: ___________________________

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<td>GE 2130, Statics</td>
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<td></td>
<td>EE 1210, Circuit Modeling I</td>
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<td>EE 2210, Circuit Modeling II</td>
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<td>EE 2220, Signals and Systems</td>
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<td>GE 2340, Mechanics of Materials</td>
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<td>or GE 2630/ME 2630, Thermoscience/Thermodynamics</td>
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<td><strong>Engineering Physics -- 21 Credits</strong></td>
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<td>EP 3240, Applied Mechanics (Fall only)</td>
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<td>EP 3640, Electric &amp; Magnetic Fields (Fall &amp; Spring)</td>
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<td>EP 4010, Engineering Physics Lab (Fall only)</td>
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<td>EP 4140, Applied Optics (Spring only)</td>
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<td>EP 4210, Sensor Lab (Spring only)</td>
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<td>EP 4220, Engineering Quantum Mechanics (Fall only)</td>
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<td>EP 4930, Engineering Physics Design (Spring only)</td>
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<td><strong>Professional Engineering –15/16 Credits</strong></td>
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Note: Select professional engineering electives from attached list or “concentrations” page. One must be 4000 level.