ENGINEERING PHYSICS (E P)

E P 271 — ENGINEERING PROBLEM SOLVING I
3 credits.
Solution of engineering problems using commercially-available software tools (spreadsheets, symbolic manipulators, and equation solvers). The emphasis will be on nuclear engineering problems, including radioactive decay, nuclear cross sections, scattering, and criticality.
Requisites: MATH 222, PHYSICS 201
Repeatable for Credit: No
Last Taught: Fall 2017

E P 272 — ENGINEERING PROBLEM SOLVING USING MAPLE
1 credit.
An introduction to multi-step engineering problem solving using Maple (symbolic mathematics) software.
Requisites: MATH 222
Repeatable for Credit: No

E P 468 — INTRODUCTION TO ENGINEERING RESEARCH
1 credit.
An introduction to the conduct of engineering research: the scientific method, ethics in research, documentation and treatment of research data, publication practices, and the structure of the broader research community are covered.
Requisites: Open to EP majors only
Course Designation: Honors - Accelerated Honors (!)
Repeatable for Credit: No

E P 469 — RESEARCH PROPOSAL IN ENGINEERING PHYSICS
1 credit.
An introduction to current research topics in engineering physics. Development of an undergraduate research proposal supervised by faculty members. Open to EP majors only
Requisites: EP 468.
Course Designation: Honors - Accelerated Honors (!)
Repeatable for Credit: No

E P/E M A 471 — INTERMEDIATE PROBLEM SOLVING FOR ENGINEERS
3 credits.
Use of computational tools for the solution of problems encountered in engineering physics applications. Topics covered include orbital mechanics, structural vibrations, beam and plate deformations, heat transfer, neutron diffusion, and criticality. Emphasis will be on modeling, choice of appropriate algorithms, and model validation.
Requisites: MATH 319 NEEP 271 or Comp Sci 310
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No

E P/E M A 476 — INTRODUCTION TO SCIENTIFIC COMPUTING FOR ENGINEERING PHYSICS
3 credits.
Basic tools of professional scientific computation for UNIX environments are taught. Programming skills in a compiled language are developed through engineering examples. Applications reinforce engineering problem-solving skills first examined in introductory courses, while motivating progressively more advanced computational methods.
Requisites: NEEP 271 or Comp Sci 310; Comp Sci 412 or equivalent; MATH 319; or consent of instructor
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No

E P/E M A 547 — ENGINEERING ANALYSIS I
3 credits.
Methods of higher mathematics; stress on problem solving rather than rigorous proofs; linear algebra, calculus of variations, Green's function.
Requisites: A year of advanced calculus such as MATH 321 322
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2017

E P/E M A 548 — ENGINEERING ANALYSIS II
3 credits.
Function of complex variable, series solution of different equations, partial differential equations.
Requisites: A year of math beyond calculus
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No

E P/M E 566 — CRYOGENICS
3 credits.
Applications of cryogenics, material properties at low temperatures, refrigeration and liquifaction systems, measurement techniques, insulation, storage and transfer of cryogenics, safety and handling.
Requisites: ME 361 or PHYSICS 415, CHE 320 or ME 364
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No

E P 568 — RESEARCH PRACTICUM IN ENGINEERING PHYSICS I
3 credits.
Undergraduate research projects supervised by faculty members.
Requisites: Consent of instructor
Course Designation: Honors - Accelerated Honors (!)
Repeatable for Credit: No
E P 569 — RESEARCH PRACTICUM IN ENGINEERING PHYSICS II
3 credits.

Undergraduate research projects supervised by faculty members. Senior thesis.

**Requisites:** Consent of instructor

**Course Designation:** Honors - Accelerated Honors (!)

**Repeatable for Credit:** No

E P 602 — SPECIAL TOPICS IN ENGINEERING PHYSICS
1-3 credits.

Subject matter, credits and prerequisites vary.

**Requisites:** Vary

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Spring 2018

E P/E M A 615 — MICRO- AND NANOSCALE MECHANICS
3 credits.

An introduction to micro- and nanoscale science and engineering with a focus on the role of mechanics. A variety of micro- and nanoscale phenomena and applications covered, drawing connections to both established and new mechanics approaches.

**Requisites:** Graduate or professional standing or (E M A 303 and M E 306)

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

**Level - Advanced**

**L&S Credit - Counts as Liberal Arts and Science credit in L&S**

**Grad 50% - Counts toward 50% graduate coursework requirement**

**Repeatable for Credit:** No

E P/COMP SCI/E C/E M A/M E 759 — HIGH PERFORMANCE COMPUTING FOR APPLICATIONS IN ENGINEERING
3 credits.

An overview of hardware and software solutions that enable the use of advanced computing in tackling computationally intensive Engineering problems. Hands-on learning promoted through programming assignments that leverage emerging hardware architectures and use parallel computing programming languages. Students are strongly encouraged to have completed COMP SCI 367 or COMP SCI 400 or to have equivalent experience.

**Requisites:** Graduate or professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2017

E P/M E 777 — VACUUM TECHNOLOGY
3 credits.

Topics defining modern vacuum technology, including the kinetic theory of gases, conductance, pumping systems, pump technologies, pressure measurement, gas-surface interactions, sealing technologies, leak detection, and residual gas analysis will be addressed through a combination of lectures, laboratory activities, problem solving, and group discussions.

**Requisites:** Must have taken Mechanical Engineering 363 and either Chemical Biological Engineering 320 or Biomedical Engineering 320.

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2017

E P 920 — ENGINEERING PHYSICS GRADUATE SEMINAR
1 credit.

Students will be able to enroll for credit more than once because the topics of the course will differ substantially from semester to semester. Our MS requirements permit up to 3 credits within the 30-credit minimum for the degree.

**Requisites:** Graduate or professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** Yes, unlimited number of completions