EM380 Engineering Review (0-2-0)
Instructor: TBD
A comprehensive review course to prepare students to take the Engineer-In-Training (EIT) or Fundamentals of Engineering (FE) examination. Topics include mathematics, chemistry, computers, electrical engineering, engineering economics, statics, and dynamics.
Prereq: 1/C Engineering major or approval of department chair

EM486A or EM425 Numerical Methods for Engineers (3-0-3)
Instructor: CAPT Stu Blair
An introduction to numerical techniques for solving mathematical problems relevant to a range of engineering and physical systems. Applications are drawn primarily from mechanical, nuclear, and aerospace engineering. Lectures and programming assignments will cover a range of topics to include solutions of systems of linear equations, solution of non-linear equations, curve fitting, numeric integration, and numeric solution methods for differential equations.
Prereq: SM212 and an introductory course in programming such as EM215, EA208, EN275, EN330, EW202, EE322 or SI204 or equivalent

EM434 Additive Manufacturing (3-0-3)
Instructor: CAPT Brad Baker & CDR Buddy Slager
A modern and comprehensive class in Additive Manufacturing (AM) which is also called 3D printing. This class requires an introductory level of understanding of materials science which is taught in different disciplines covered in the prerequisites. Experience with Computer Aided Design (CAD), such as SolidWorks, is helpful but not required since core CAD concepts are also covered in the class. Modern 3D printing technologies are used hands-on during course projects and assignments, and students will learn skills that can be applied in other courses or projects. Techniques including Fused Deposition Modeling, Stereolithography, Selective Laser Sintering, Bound Metal Deposition and other techniques are covered. Historically this class has included guest lectures from governmental and industry partners on the use and future of AM. This class is particularly well suited to prepare engineering students who wish to use 3D printing as part of their capstone project or independent research project.
Prereq: EM217, EM221, EA222, EN222, or approval of the Dept Chair
EM436 Mechanics of Composite Structures (2-2-3)
Instructor: Prof. Peter Joyce
Mechanics of Composite Structures is an introductory course that emphasizes the mechanics of structures containing composite materials. Mechanics topics covered include generalized Hooke's Law, lamina constitutive relationships, lamina strength analysis, micro-mechanics of fiber reinforced lamina, and the mechanics of composite laminates. In addition materials science and manufacturing of composites are covered. A project that requires both the design, manufacture and testing of a composite component or structure concludes this course
Prereq: EM217

EM444 Solar Engineering (3-0-3)
Instructor – Distinguished Visiting Prof. Robert Fishman
An introduction to solar energy conversion and utilization. Topics covered include solar radiation, collectors, energy storage, solar heating, solar cooling, photovoltaic converters and wind energy.
Prereq: 1/C Engineering major or approval of department chair

EM447 Wind and Tidal Energy (3-0-3)
Instructor: Asst. Prof. Ethan Lust
This course will cover the basics of wind turbine technology including the design of wind turbines, analysis of wind regimes and wind energy conversions systems. Land based and off shore turbines will be discussed as well as emerging turbine systems using water currents. The course includes two experimental projects that are tested in the wind tunnel and tow tank. The economics and policies involved in implementing this type of renewable energy will also be studied.
Prereq: Thermodynamics (EM317 or EM319) and Fluid Mechanics/Aerodynamics (EM316, EM324 or EA301)

EM458 Failure Analysis (2-2-3)
Instructor – Prof. Joel Schubbe
A course designed to introduce the student to the principles, tools and techniques used in the analysis of materials failures. Laboratory skills in non-destructive testing, optical and electron microscopy, mechanical testing, corrosion and wear testing are developed. Emphasis is placed on actual case histories and the student is required to complete analysis of a failed component.
Prereq: EM313 or ER313. Coreq: EM371, or Dept Chair approval
EM461 Engines: Principles, Design and Applications (2-2-3)
Instructor: Prof. Jim Cowart
The course objective is to provide a fundamental understanding of reciprocating internal-combustion engine design and operation. This is achieved by linking existing engine hardware design and performance analysis to concepts and disciplines studied in the mechanical engineering curriculum.
Prereq: EM320 and EM324, or Dept Chair approval

EM486I or 462 Energy Analysis, Policy, and Security (3-0-3)
Instructor – Prof. Patrick Caton
Using a multi-disciplinary approach, this course will focus on understanding and analyzing broad energy concepts that lie at the heart of the present-day debate over climate and energy and framed by the concept of energy security. Roughly half of the course meetings will be as a large group with two other companion sections offered in the Ocean and Atmospheric Sciences and Economics departments; these large group lectures and discussions will aim to develop an interdisciplinary toolbox of key technology, economic, policy, and environmental concepts. The other half of the time, this engineering section will meet to apply these tools to designs of future energy systems that attempt to meet the competing constraints of climate targets, resilient energy demand, and low cost.
Prerequisites: EM317 or EM319 or Dept Chair approval

EM473 Design of Modern Weapons (3-0-3)
Instructor: Visiting Prof. Ken Conley
The course teaches Midshipmen how weapons are designed, manufactured, tested and utilized. They will learn about how explosives and propellants are made and how they function. Next they will learn what makes a warhead blow up and what happens once it does. Students will have the chance to design, build and test an actual warhead offsite. They will also learn how fragments and bullets penetrate various materials such as armor and soil. Finally they will learn about the targeting cycle and how these weapons are used to support the warfighter.
Prereq: 1/C Engineering major or Dept Chair approval

EM476 Vehicle Dynamics (2-2-3)
Instructor: Prof. Len Hamilton
The fundamentals of passenger vehicle and light truck design and vehicle dynamics are covered. Engineering principles associated with acceleration, braking, handling, ride quality, aerodynamics and tire mechanics, as well as suspension and steering design are discussed. Additionally, many lab exercises allow students to evaluate vehicle systems.
Prereq: 1/C MNE Engineering major or approval of department chair
EM496 Mechanical Engineering Research or Design Project (0-6-3)
Instructor – Various
Students will coordinate with a professor to pursue a research topic that interests them. Students are required to submit a proposal in conjunction with the project and meet with their professor regularly throughout the semester. Projects may be a single-semester or last the duration of the year.
Prereq: Approval of Department Chair

ER461 Nuclear Weapons Effects (3-0-3)
Instructor: Assoc. Prof. Steve McHale or LCDR John Joyce
Introduction to nuclear weapons with historical references, yield calculations, physics of assembly, fission, fusion, and disassembly. Prompt and residual effects, modeling, biological effects, and nuclear policy are covered.
Prereq: SP212, SM212

Nuclear Engineering Courses
The required courses for ENR majors below may serve as electives for other majors.

ER301 Fundamentals of Nuclear Engineering (3-0-3)
Instructor: TBD
An introductory course in the basics of nuclear engineering and radiological sciences. Subject areas include the basics in radiation physics, nuclear core physics, nuclear plant design, the fuel cycle and radiological health physics.
Prereq: SP211 (or equivalent) Coreq: SP212 (or equivalent).

ER362 Reactor Physics (2-2-3)
Instructor: TBD
Reactor Physics provides the principles underlying power generation in both a steady state and transient fission reactor. Subject areas include neutron diffusion and slowing down theory, criticality, bare, reflected and heterogeneous reactors, reactor kinetics, and reactor control. Experiments and classroom exercises include determination of important reactor parameters, computational methods, and the use of plant simulation software.
Prereq: ER301

ER371 Nuclear Plant Design (3-0-3)
Instructor: TBD
Fundamentals of nuclear power plant design, with emphasis on basis for light water reactor design. Topics include power reactor economics, design considerations with the nuclear fuel cycle, primary and secondary system components and reactor safety.
Prereq: ER301
ER463 Radiation Engineering (2-2-3)
Instructor: TBD
An introductory course in basic radiation detection and measurement systems. Subject areas include radiation statistics, data analysis, gas-filled detectors, scintillation detectors, semi-conductor detectors, gamma and charged particle spectroscopy, signal processing and electronics, neutron detection techniques, activation analysis, neutron generators, and radiation detection applications.
Prereq: ER301