ENGINEERING MECHANICS AND ASTRONAUTICS (E M A)

E M A 1 — COOPERATIVE EDUCATION PROGRAM
1 credit.

Work experience which combines classroom theory with practical knowledge of operations to provide students with a background upon which to base a professional career in industry. Enroll Info: So st
Requisites: None
Course Designation: Workplace - Workplace Experience Course
Repeatable for Credit: Yes, unlimited number of completions

E M A 110 — INTRODUCTION TO PRIVATE PILOT
4 credits.

The first course of a two-course series to earn a private pilot’s license. This first course will teach students all of the ground-school subjects necessary to become a private pilot. Lecture topics include aircraft structure, mechanical systems, flight instruments and avionics, aerodynamics, aircraft performance, aviation meteorology, airport operations, navigation, aeromedical factors, rules and regulations. In-class discussion will center around PC-based simulation scenarios that feature classroom demonstrations of the theory taught online. Students will be charged flight fees for this course. Flight fees may vary, dependent on skill of student and instructor fees. See the class notes for information about fees. Enroll Info: None
Requisites: None
Repeatable for Credit: No
Last Taught: Fall 2017

E M A 120 — PRIVATE PILOT CERTIFICATION
3 credits.

Private Pilot II is a follow-on course for E M A 110: Introduction to Private Pilot, and it serves as a finisher course for students who have either taken E M A 110 or have some flying experience and have passed their FAA written exam. The two-series course is designed to take students from zero flying experience to certificated private pilots. Enroll Info: None
Requisites: E M A 110
Repeatable for Credit: No

E M A 201 — STATICS
3 credits.

Principles of mechanics, force systems, equilibrium, structures, distributed forces, moments of inertia of areas, and friction. Enroll Info: MATH 222 or concurrent registration. Open to Freshmen
Requisites: None
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 M A 202 — DYNAMICS
3 credits.

Kinematics, force-mass-acceleration relations, work and energy, impulse and momentum, moments of inertia and mass. Enroll Info: EMA 201 or 214, and MATH 222; or consent of instructor
Requisites: None
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 M A 291 — PROJECTS IN ENGINEERING MECHANICS & ASTRONAUTICS
1-3 credits.

Individual engineering projects under staff supervision. Enroll Info: None
Requisites: Consent of instructor
Repeatable for Credit: No
Last Taught: Spring 2016

E M A 303 — MECHANICS OF MATERIALS
3 credits.

Stress and strain, torsion, bending of beams, shearing stresses in beams, compound stresses, principal stresses, deflections of beams, statically indeterminate members, columns. For civil engineers. Enroll Info: EMA 201 & MATH 222
Requisites: None
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 M A/M E 307 — MECHANICS OF MATERIALS LAB
1 credit.

Data processing, tension/compression tests, creep stress concentrations, fatigue, fracture, composite materials, combined stress, beam flexure, dynamic loads, buckling. Enroll Info: ME 306 or concurrent registration
Requisites: None
Repeatable for Credit: No

E M A/CIV ENGR 395 — MATERIALS FOR CONSTRUCTED FACILITIES
3 credits.

Properties and tests of materials used in the initial construction or repair of facilities (including buildings, transportation systems, utility systems, and reinforced earth). Introduction to laboratory and field measurement techniques to assess material performance capabilities. Technical report preparation. Enroll Info: EMA 303 & 307
Requisites: None
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2018
E M A 405 – PRACTICUM IN FINITE ELEMENTS
3 credits.

Use of finite elements (FE) for solving practical problems in mechanics. Elementary theory of FE is discussed. A commercial computer program is used for applications. Major emphasis is on behavior of FE, modeling, and evaluation of results for correctness. Enroll Info: EMA 214, 303, 304, or 306; EMA 202 or 221; knowledge of elementary matrix algebra or consent of instructor

Requisites: None
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: Yes
Last Taught: Spring 2018

E M A/CBE/CHEM/M E 425 – UNDERGRADUATE RHEOLOGY SEMINAR
1 credit.

Rheology seminar course encouraged for all interested in professions related to polymers, suspensions or rheology; will not count toward credit requirement of the major. Enroll Info: None

Requisites: Junior standing
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Fall 2011

E M A 469 – DESIGN PROBLEMS IN ENGINEERING
3 credits.

The design philosophy is presented. Students will be required to apply their knowledge of elementary mechanics, engineering and basic science to arrive at acceptable solutions to a variety of design problems. Enroll Info: EMA 221, 307; ECE 376; ME 363, 361; MS&E 350; or cons inst

Requisites: None
Repeatable for Credit: No
Last Taught: Fall 2017

E M A/E P 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. Enroll Info: MATH 319 & NEEP 271 or COMP SCI 310

Requisites: None
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
Last Taught: Spring 2018

E M A/E P 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. Enroll Info: NEEP 271 or COMP SCI 310; COMP SCI 412 or equivalent; MATH 319; or consent of instructor

Requisites: None
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
Last Taught: Spring 2018

E M A 489 – HONORS IN RESEARCH
1-3 credits.

Undergraduate research and senior honors thesis in engineering mechanics and astronautics. Enroll Info: Honors candidacy in engineering mechanics

Requisites: Consent of instructor
Course Designation: Honors - Honors Only Courses (H)
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2009

E M A 506 – ADVANCED MECHANICS OF MATERIALS I
3 credits.

Analysis and design of load-carrying members, shear center, unsymmetrical bending, curved beams, beams on elastic foundations, energy methods, theories of failure, thick-walled cylinders, stress concentrations, design to prevent failure by excessive elastic deformation, plastic deformation and fracture. Enroll Info: EMA 214, 304, or 306/307

Requisites: None
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2017

E M A/CIV ENGR/M E 508 – COMPOSITE MATERIALS
3 credits.

Physical properties and mechanical behavior of polymer, metal, ceramic, cementitious, cellulosic and biological composite systems; micro- and macro-mechanics; lamination and strength analyses; static and transient loading; fabrication; recycling; design; analytical-experimental correlation; applications. Enroll Info: None

Requisites: M E 444 or M E/EMA 570 or EMA 506 or graduate standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2018
E M A 519 — FRACTURE MECHANICS  
3 credits.

Introduction to the mechanics of fracture of linear and nonlinear materials. Crack stress and deformation fields; stress intensity factors; crack tip plastic zone; fracture toughness testing, energy release rate; J-integral. Criteria for crack growth initiation/stability; application to design. Enroll Info: EMA 214, 304, or 306/307  
Requisites: None  
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement  
Repeatable for Credit: No  
Last Taught: Spring 2018

E M A 521 — AERODYNAMICS  
3 credits.

Potential flow theory; stream functions; vortex filaments and sheets. Two- and three-dimensional wing theory. Doublet and panels methods. Propeller theory. Enroll Info: EMA 202; CEE 310 or ME 363; MATH 234; or consent of instructor  
Requisites: None  
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  
Repeatable for Credit: No  
Last Taught: Fall 2017

E M A 522 — AERODYNAMICS LAB  
3 credits.

Teams of two or three students perform case study of a wing using computer simulations and lab experiments. Experimental and computational results are compared against theoretical predictions developed in prerequisite class. Results are presented in three oral and three written reports. Enroll Info: EMA 521  
Requisites: None  
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement  
Repeatable for Credit: No  
Last Taught: Spring 2018

E M A 523 — FLIGHT DYNAMICS AND CONTROL  
3 credits.

Requisites: None  
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement  
Repeatable for Credit: No  
Last Taught: Spring 2018

E M A/E M E 540 — EXPERIMENTAL VIBRATION AND DYNAMIC SYSTEM ANALYSIS  
3 credits.

Application of digital data acquisition to the investigation of mechanical components, structures and systems using time histories, transforms and response functions to characterize free, forced and transient inputs. Introduction to sensors, instrumentation and methods appropriate for dynamic system response. Enroll Info: ME 340 or ME 440 or EMA 545 or cons inst  
Requisites: None  
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement  
Repeatable for Credit: No  
Last Taught: Fall 2017

E M A/M S & E 541 — HETEROGENEOUS AND MULTIPHASE MATERIALS  
3 credits.

Principles of the mechanics of solid multiphase systems. Role of heterogeneity and anisotropy in determining physical properties including elastic, dielectric and piezoelectric properties. Applications in lightweight structures, ultrastrong materials, materials for protection of the body, and materials for the replacement of human tissues. Materials with fibrous, lamellar, particulate, and cellular structures. Heterogeneous materials of biological origin. Biomimetic and bio-inspired materials. Enroll Info: EMA 303 or ME 306 or M S & E 441 or equivalent  
Requisites: None  
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement  
Repeatable for Credit: No  
Last Taught: Fall 2016

E M A 542 — ADVANCED DYNAMICS  
3 credits.

Kinematics and kinetics of plane and three-dimensional motion, Coriolis acceleration, general methods of linear and angular momentum, central force motion, gyrodynamics, generalized coordinates. Lagrange’s equations. Enroll Info: EMA 202 or 221; EMA 307; Math 223; or consent of instructor  
Requisites: None  
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  
Repeatable for Credit: No  
Last Taught: Fall 2017
E M A 545 — MECHANICAL VIBRATIONS
3 credits.

General theory of free, forced, and transient vibrations; vibration transmission, isolation, and measurement; normal modes and generalized coordinates; method of matrix equation formulation and solution. The application of theory and methods to the analysis, measurement and design of dynamic systems. Enroll Info: EMA 202 or 221; EMA 307; Math 223; or consent of instructor

Requisites: None
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
Repeatable for Credit: No
Last Taught: Spring 2018

E M A/E P 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. Enroll Info: A year of advanced calculus such as MATH 321 & 322

Requisites: None
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 M A/E P 548 — ENGINEERING ANALYSIS II
3 credits.


Requisites: None
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: Spring 2018

E M A/ASTRON 550 — ASTRODYNAMICS
3 credits.

Coordinate system transformations, central force motion, two body problem, three and n-body problem, theory of orbital perturbations, artificial satellites, elementary transfer orbits, and elementary rocket dynamics. Enroll Info: EMA 202 or 221; or PHYSICS 311 or con reg; or cons inst

Requisites: None
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
Repeatable for Credit: No
Last Taught: Spring 2018

E M A 569 — SENIOR DESIGN PROJECT
3 credits.

Students will select specific engineering design projects. These projects will be student team efforts supervised by individual faculty members. Enroll Info: EMA 469, & any two of EMA 542, 545, 506, or consent of instructor

Requisites: None
Repeatable for Credit: No
Last Taught: Spring 2018

E M A/M E 570 — EXPERIMENTAL MECHANICS
3 credits.

Experimental methods for design and analysis of mechanical components, structures and materials. Electrically and optically recorded stress, strain and deformation data; computer acquisition/reduction/presentation techniques; applications to static and transient events, sensors, transducer design, NDT, fracture and residual stresses. Enroll Info: ME 306 or EMA 214 or 303 or 304 or cons inst

Requisites: None
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2016

E M A 599 — INDEPENDENT STUDY
1-3 credits.

Enroll Info: None

Requisites: Consent of instructor
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: Yes, unlimited number of completions

E M A 601 — SPECIAL TOPICS IN ENGINEERING MECHANICS
1-3 credits.

Selected topics in such areas as structural mechanics, dynamics, experimental mechanics, vibrations, engineering materials, soil mechanics, engineering analysis, rheology, etc. Enroll Info: None

Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2018

E M A 605 — INTRODUCTION TO FINITE ELEMENTS
3 credits.

A first course in finite elements, with theory and applications in stress analysis and in areas related to structural mechanics. Practice in the use and/or development of computer programs. Enroll Info: None

Requisites: Graduate/professional standing or E M A 303 or (M E 306 and MATH 320) or (M E 306 and MATH 340)
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2017
E M A 610 — STRUCTURAL FINITE ELEMENT MODEL VALIDATION
3 credits.
An introduction to test-based validation of finite element models for the
design and analysis of dynamic structures. Enroll Info: None
Requisites: Graduate standing or E M A 405, E M A 545 or M E 440
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2017

E M A 611 — ADVANCED MECHANICAL TESTING OF MATERIALS
3 credits.
Theory and use of servo-controlled, electro-hydraulic equipment for research of mechanical properties of engineering materials.
Measurement of stress, strain, hysteresis energy, and material properties
during deformation and at fracture. Analysis of four significant components of total strain. Enroll Info: None
Requisites: Graduate standing or E M A/M E/E M A 307 and (E M A 506 or concurrent enrollment)
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2018

E M A/E P 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. Enroll Info: None
Requisites: Graduate/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
Last Taught: Spring 2012

E M A 622 — MECHANICS OF CONTINUA
3 credits.
Tensor analysis; analysis of stress, strain and rate of strain; application
of Newtonian mechanics to deformable media; mechanical constitutive equations; field equations of fluid mechanics and elasticity. Enroll Info: None
Requisites: Graduate/professional standing or ((MATH 340 or MATH 320) and MATH 321)
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
Last Taught: Spring 2017

E M A 630 — VISCOELASTIC SOLIDS
3 credits.
Linear theory of viscoelasticity; non-aging materials; Boltzmann superposition principle; time-temperature superposition boundary value problems. Applications: vibration damping, relaxation of stress, creep, droop, and sag in structural members, sound absorption, creep buckling, settlement of foundations, tire mechanics, and shock attenuation. Enroll Info: None
Requisites: Graduate standing or E M A 506 or E M A 303
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2017

E M A 642 — SATELLITE DYNAMICS
3 credits.
Review of Euler’s equations, torque-free motion, stability of rotation, energy dissipation effects, gyroscopic instruments, gyrodynamics of the Earth, gravity gradient stabilized satellites, spin stabilized satellites, dual spin satellites, tethered satellites, mass movement techniques, space vehicle motion and rocket dynamics. Enroll Info: None
Requisites: Graduate/professional standing or E M A 542
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2018

E M A 690 — MASTER'S RESEARCH
1-9 credits.
Enroll Info: None
Requisites: Declared in an Engineering Mechanics graduate program
Repeatable for Credit: Yes, unlimited number of completions

E M A 700 — THEORY OF ELASTICITY
3 credits.
Equations of elasticity in curvilinear and rectangular coordinates; two dimensional problems; problems of prismatic bars; variational methods and energy principles; complex variable and numerical methods; thermal stress problems. Enroll Info: EMA 506 & MATH 321 or cons inst
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2016

E M A 702 — GRADUATE COOPERATIVE EDUCATION PROGRAM
1-2 credits.
Work experience that combines classroom theory with practical knowledge of operations to provide students with a background on which to develop and enhance a professional career. The work experience is tailored for MS students from within the U.S. as well as eligible international students. Enroll Info: None
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Fall 2016
E M A 703 — LINEAR VISCOELASTICITY AND PLASTICITY
3 credits.
Linear theory of solid and fluid viscoelasticity. Solution of problems by
transform techniques. Wave propagation. Thermoviscoelasticity. Yield
criteria. Plastic stress-strain relations. Solution of problems for the
perfectly plastic material and the elastoplastic material. Enroll Info: EMA
622 or cons inst
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework
requirement
Repeatable for Credit: No
Last Taught: Fall 2015

E M A 705 — ADVANCED TOPICS INFINITE ELEMENTS
3 credits.
Finite element methods for problems with linear and nonlinear media.
Stress analysis, heat transfer, and fluid dynamics. Vibration and
transient analysis. Weighted residual methods. Material and geometric
nonlinearity. Nonlinear iteration methods. Instructor may also select
additional material. Enroll Info: EMA 605
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework
requirement
Repeatable for Credit: No
Last Taught: Spring 2018

E M A/M E 706 — PLATES, SHELLS AND PRESSURE VESSELS
3 credits.
Stress and deflection analysis of structural plates and membranes under
mechanical and thermal loads; variational and numerical methods;
instability and vibrations; membrane shell theory; cylindrical shells;
pressure vessel and piping design applications; ASME Pressure Vessel
Code. Enroll Info: ME 444 or EMA 506 or cons inst
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework
requirement
Repeatable for Credit: No
Last Taught: Spring 2017

E M A/M E 708 — ADVANCED COMPOSITE MATERIALS
3 credits.
Contemporary topics such as new materials; smart materials/structures/
systems; fatigue; fracture; experimental techniques; nondestructive
evaluation; transient, micro, three-dimensional, nonlinear, inelastic and
environmental effects; manufacturing methods: repair and applications.
Enroll Info: ME/EMA 508 or cons inst
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework
requirement
Repeatable for Credit: No
Last Taught: Fall 2016

E M A 722 — INTRODUCTION TO POLYMER RHEOLOGY
3 credits.
Formulation of constitutive equations using embedded base vectors.
Viscosity, normal stress differences, stress relaxation, elastic recoil.
Polymer rheology, homogeneous strain history. Enroll Info: MATH 320 or
cons inst
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework
requirement
Repeatable for Credit: No
Last Taught: Fall 2012

E M A 742 — THEORY AND APPLICATIONS IN ADVANCED DYNAMICS
3 credits.
Dynamical systems theory, advanced rigid body attitude dynamics,
Lagrange's equations of motion, conservation laws, quasi-coordinates,
Routh’s method for ignorable coordinates, Hamilton’s equations
of motion, dynamic stability, Liapunov stability methods, angular
momentum methods for systems of rigid bodies, modeling of rotating
elastic systems, Kane’s equations of motion, deterministic chaos. Enroll
Info: EMA 542 or PHYSICS 311 or cons inst
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework
requirement
Repeatable for Credit: No
Last Taught: Fall 2015

E M A 745 — ADVANCED METHODS IN STRUCTURAL DYNAMICS
3 credits.
Emphasis is placed on techniques used to analyze aerospace structures.
Variational principles, Hamilton’s extended principle, Lagrange’s
equations, mathematical models for continuous systems, natural
modes of vibrations, dynamic response using mode superposition,
mode acceleration, residual flexibility, vibration analysis using finite
element methods, advanced substructure representations, component
mode synthesis, systems with rigid body modes for aeronautical and
astronautical systems. Enroll Info: EMA 545, EMA 405 or equiv or cons
inst
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework
requirement
Repeatable for Credit: No
Last Taught: Fall 2016
E M A 747 — NONLINEAR AND RANDOM MECHANICAL VIBRATIONS
3 credits.

Exact solutions and sectorial linearization; free and forced vibration of mechanical systems with nonlinear restoring force; self-excited mechanical vibrations and relaxation vibrations; subharmonic responses; nonlinear vibration of mechanical systems with more than one degree of freedom; nonlinear vibration of bounded continuous media; random excitation and random response, random vibrations of mechanical systems and structures; random vibrations of nonlinear mechanical systems; failure of materials under random vibrations. Enroll Info: EMA 745

Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2017

E M A/COMP SCI/E C/E/E P/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. Enroll Info: None

Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2017

E M A 790 — MASTER'S RESEARCH AND THESIS
1-9 credits.

Enroll Info: For Master's candidates only
Requisites: Declared in an Engineering Mechanics graduate program
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions

E M A 890 — PRE-DISSERTATOR RESEARCH
1-9 credits.

Enroll Info: For pre-dissertation stdts only
Requisites: Declared in an Engineering Mechanics graduate program
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions

E M A/CBE/CHM/M E 925 — RHEOLOGY RESEARCH SEMINAR
1 credit.

Exploration of the most recent research literature on viscoelasticity, constitutive equations, non-Newtonian flow systems, fluid metering devices, kinetic theory of macromolecules, and rheooptical phenomena. Periodic reports on recent advances made by research workers in the various rheology groups on the Madison campus. Enroll Info: None

Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Fall 2011

E M A 990 — RESEARCH AND THESIS
1-12 credits.

Enroll Info: For students with dissertator status only
Requisites: Declared in Engineering Mechanics PhD
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions