Master of Engineering (MENG)

Courses

MENG 400. Engineering Law. 3 or 4 hours.
Overview of the legal system. Legal principles affecting the engineering profession. Professional ethics in engineering. Intellectual property law. Basic contract and tort principles. Environmental law. Course Information: Same as ENGR 400. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. This is an online web-based course. Prerequisite(s): Senior standing or above.

MENG 401. Engineering Management. 3 or 4 hours.
Theory, strategy, and tactics of the use of project management including project planning, matrix management concept, and team meetings. Course Information: Same as ENGR 401. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. This is an online web-based course. Prerequisite(s): Senior standing or above.

MENG 402. Intellectual Property Law. 3 or 4 hours.
Patent, copyright, trade secret, mask work, and cyber-squatting legal and procedural principles; protection for novel software, biotech inventions, and business methods; and trademark protection for domain names. Course Information: Same as ENGR 402. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. This is an online web-based course. Prerequisite(s): Senior standing or above.

MENG 403. Reliability Engineering. 3 or 4 hours.
Probability overview; statistics overview; system reliability modeling and prediction-static methods; system reliability modeling and prediction-dynamic methods; maintainability and availability; reliability optimization; and risk analysis. Course Information: Same as ENGR 403. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. This is an online web-based course. Prerequisite(s): Senior standing or above.

MENG 405. Foundations of Emergency Management. 4 hours.
Introduces the principles of emergency management including the history of EM in the United States; the roles of federal, state, and local EM agencies; national response concepts; and preparedness, recovery, and mitigation strategies. Course Information: Extensive computer use required. Online web-based course.

MENG 406. Critical Infrastructure. 4 hours.
Designed to enable students to formulate policies and strategies aiming to protect the leading critical infrastructure sectors in the U.S. (e.g., energy, water, telecommunications, internet, etc.). Course Information: Extensive computer use required. Online web-based course.

MENG 411. Non-Newtonian Fluids. 3 or 4 hours.
Fluid mechanics and transport processes involving non-Newtonian fluids. Purely viscous and viscoelastic behavior. Viscometric functions and rheometry. Heat and mass transfer in non-Newtonian fluids. Course Information: Same as CHE 440. 3 undergraduate hours. 4 graduate hours. Prerequisite(s): CHE 410 or MENG 410 or consent of the instructor.

MENG 412. Computational Molecular Modeling. 3 or 4 hours.
Provide students with a fundamental understanding of the methods, capabilities and limitations of molecular simulations. Course Information: Same as CHE 438. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. Prerequisite(s): CHE 301. Recommended background: Engineering/Science.

MENG 413. Fundamentals and Design of Microelectronics Processes. 3 or 4 hours.
Design and practical aspects of the most advanced state of micro- and nano-electronics processing with emphasis on thin film deposition, substrate passivation, lithography and etching with thermodynamics, kinetics, reactor design, and optimization. Course Information: Same as CHE 456. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. Prerequisite(s): Graduate standing or consent of the instructor. Recommended background: Engineering/Science.

MENG 421. Quasi-Static Electric and Magnetic Fields. 4 hours.
Quasi-static approximations to Maxwell's equations. Scalar potential; capacitance; conduction; polarization; mixing formulas. Magnetization; vector potential; Biot-Savart law. Forces, energy and power. Poynting's theorem. Course Information: Previously listed as ECE 401. Extensive computer use required. Prerequisite(s): Graduate or professional standing; and consent of the instructor. Recommended background: Calculus through Differential Equations. College Physics.

MENG 422. Foundations of Electromagnetic Compatibility. 4 hours.
EMC requirements for electronic systems; non-ideal behavior of components; radiated and conducted emissions; susceptibility; coupling and shielding; electrostatic discharge; system design for EMS; Projects required. Course Information: Extensive computer use required. Prerequisite(s): Graduate or professional standing; and consent of the instructor. Recommended background: Undergraduate knowledge in Electromagnetic Fields.

MENG 425. Transmission Lines for Communication and Power. 4 hours.
Two-conductor lines. Impedance matching. Wideband systems. Scattering matrix. Three-phase systems. Course Information: Extensive computer use required. Prerequisite(s): MENG 421 or consent of instructor. Recommended background: Undergraduate knowledge of electricity and magnetism.

MENG 426. Antennas and Arrays. 4 hours.
Antenna definitions and parameters. Linear antennas; self and mutual impedances. Arrays. Microstrip, broadband, and reflector antennas. Course Information: Extensive computer use required. Prerequisite(s): Graduate or professional standing and MENG 421, or consent of instructor. Recommended background: Undergraduate knowledge of electromagnetic fields.

MENG 435. Wireless Communication Networks. 4 hours.
Radio technology fundamentals; channel and propagation models; channel multiple access technologies; wireless mobile communication fundamentals; generic wireless mobile network; cellular/PCS wireless mobile network standards. Course Information: Extensive computer use required. Prerequisite(s): Graduate or professional standing and MENG 421, or consent of instructor. Recommended background: Undergraduate knowledge of electromagnetic fields.

MENG 436. Wireless Data. 3 or 4 hours.
Data communications, existing Wireless Data Networks, planning, topology, performance, and operation. Course Information: Same as ENGR 436. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. This is an online web-based course. Prerequisite(s): Senior standing or above and a course in digital communications and an introductory course in wireless communications.
MENG 480. Introductory Bioinformatics. 4 hours.  
Practical analysis of genomic sequences and other high throughput data.  
Basics of sequence alignment, biological database search, protein motif  
search, gene expression analysis, and structural bioinformatics. Course  
Information: Extensive computer use required. Prerequisite(s): Graduate  
or professional standing; and consent of the instructor. Recommended  
background: Background in Computer Science and Biology.

MENG 481. Introduction to Biostatistics. 4 hours.  
Introduce basics about statistical treatment, model estimation, and  
parameter inference from observed biological data. Provide practical  
skills for summarizing and inference of experimental data. Course  
Information: Extensive computer use required. Prerequisite(s): Graduate  
or professional standing; and consent of the instructor. Recommended  
background: Background in Computer Science and Biology.

MENG 483. Bioinformatics Approach to Molecular Modeling. 4 hours.  
Protein structure prediction and comparison. Monte Carlo and molecular  
dynamics simulations. Course Information: Course Information: Extensive  
computer use required. Prerequisite(s): Graduate or professional  
standing; and consent of the instructor. Recommended background:  
Background in Computer Science and Biology.

MENG 505. Environmental Risk. 4 hours.  
Covers vulnerability and risk management (RM) methodologies with an  
emphasis on the decision tree technique and its potential to facilitate the  
analysis and identification of optimal RM alternatives. Course Information:  
Extensive computer use required. Online web-based course.

MENG 506. Disaster Response. 4 hours.  
teaches the development and implementation of a standards-based,  
auditable and actionable Business Continuity Management (BCM) system  
which is a cornerstone for building disaster resilient communities. Course  
Information: Extensive computer use required. Online web-based course.

MENG 510. Transport Phenomena. 4 hours.  
Continuum theory of momentum, energy, and mass transfer. Viscous  
behavior of fluids. Laminar and turbulent flow. thermal conduction and  
convection, diffusion and coupled operations. Course Information: Same  
as CHE 520. Previously listed as MENG 410. Prerequisite(s): Consent  
of the instructor. Recommended Background: B.S. degree in chemical  
engineering or a related discipline.

MENG 512. Microhydrodynamics, Diffusion and Membrane Transport. 4 hours.  
Theoretical and numerical fluid mechanics of microstructure: potential  
flow and virtual mass, quasistatic versus transient Stokes flow, integral  
theorems, multipole expansions, singularity solutions, fluctuations,  
and current applications. Course Information: Same as CHE 512.  
Prerequisite(s): CHE 410 or MENG 410 and CHE 445 or consent of the  
instructor.

MENG 520. Electromagnetic Fields. 4 hours.  
Maxwell's equations. Potentials. Constitutive relations. Boundary  
conditions. Polarization. Radiation from antennas. Waveguides and  
resonators. Exterior boundary - value problems. Course Information:  
Extensive computer use required. Prerequisite(s): Graduate or  
professional standing; and consent of the instructor. Recommended  
background: Undergraduate-level knowledge of electromagnetic fields.

MENG 526. Electromagnetic Scattering and Radar Signatures. 4 hours.  
Exact solutions of exterior boundary-value problems; low and high  
frequency methods; hybrid techniques; theory of radar targets; radar  
cross-sections. Course Information: Extensive computer use required.  
Prerequisite(s): Graduate or professional standing; and consent of the  
instructor. Recommended Background: MENG 520.

MENG 527. Photonics. 4 hours.  
Optical resonators. Radiation and atomic systems. Laser oscillation.  
Nonlinear optics. Electrooptics and acoustooptics. Periodic media.  
Course Information: Extensive computer use required. Prerequisite(s):  
Graduate or professional standing; and consent of the instructor.  
Recommended Background:undergraduate background in  
electromagnetics.

MENG 535. Advanced Wireless Communication Networks. 4 hours.  
2nd generation: IS-95-based wireless mobile network; 2nd generation:  
GSM-based wireless mobile network; 2.5 generation: wireless mobile  
data/voice network; 3rd generation: broadband wireless mobile  
multimedia network. Course Information: Previously listed as ECE 535.  
Extensive computer use required. Prerequisite(s): MENG 435; and  
graduate or professional standing; and consent of the instructor.

MENG 551. Engineering Thermodynamic. 4 hours.  
Thermophysical properties: First and second laws; Closed vs open  
system; Thermodynamic cycles; Fluid phase equilibria and stability;  
Nonideal solutions and activity coefficients; Electrolytes; Gibbs-Duhem  
relations. Engineering applications. Course Information: Extensive  
computer use required. A basic understanding of thermodynamics, such  
as one might get in ME 325 or the equivalent.

MENG 582. Computational Genomics. 4 hours.  
Modern statistical and computational methods relevant to analysis  
of functional genomics data; cluster analysis of gene expression  
profiles; methods of construction of co-expression network. Course  
Information: Extensive computer use required. Prerequisite(s): Graduate  
or professional standing; and consent of the instructor. Recommended  
background: BIOE 480 and BIOE 439 and R programming languages.

MENG 594. Adv Special Topics Engineering. 4 hours.  
Particular topics vary from term to term depending on the interests of  
students and specialties of the instructor. Course Information: Extensive  
computer use required. Online web-based course.