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821*. Groundwater Hydraulics
Fall. 3(3-0)
P: CE 421 and CE 422
Physical properties of porous media; equations of flow in saturated media; flow nets; well flow and parameter measurement; transport processes and the synthesis-dispersion equation for conservative contaminants.
QP: CE 321 CE 421 QA: CE 821

822*. Experimental Fluid Mechanics in Civil Engineering
Fall of even-numbered years. 3(1-6)
P: CE 422 or ME 431
Design and conduct laboratory experiments in fluid mechanics related to civil and environmental engineering; computer-based data acquisition; interpretation and analysis of experimental data.
QP: CE 422

823*. Environmental Fluid Mechanics
Fall of odd-numbered years. 3(3-0)
P: CE 422 or ME 431
Fundamentals of pollutant dispersion: mixing phenomena; molecular diffusion; turbulent dispersion; shear flow dispersion; the convective-diffusion equation; analytical solutions; simplified solutions; momentum, mass and heat transport.
QP: CE 321 CE 423 QA: CE 826

824*. Free Surface Flow
Fall of odd-numbered years. 3(3-0)
P: CE 422
Steady and unsteady open-channel flow: profile synthesis, surge and wave phenomena, computer modeling. Introduction to coastal engineering: wave theory, wave statistics, breakwater design.
QP: CE 422 QA: CE 828 CE 924

825*. Fluid Transients
Fall of odd-numbered years. 3(3-0)
P: CE 422 or ME 431
Application of unsteady flow concepts and wave mechanics to hydraulic engineering: method of characteristics; surges and water hammer in piping systems; resonance phenomena.
QP: CE 321 QA: CE 829

831*. Pavement Design and Analysis II
Spring. 3(3-0)
P: CE 431
Theoretical models for the analysis of pavement systems; evaluation and application of current design practices as related to elastic and plastic theory; formulation of improved design procedures.
QP: CE 494 QA: CE 840

835*. Engineering Management of Transportation Networks
Fall of odd-numbered years. 3(3-0)
P: CE 433
Engineering monitoring, and theoretical and statistical analysis of pavement networks to determine distress mechanisms, causes of distress, and possible engineering actions; prioritization and optimizations of the engineering actions.
QA: CE 890

837*. Transportation Materials Engineering
Fall of odd-numbered years. 3(3-0)
P: CE 418
Engineering characteristics of soils and materials commonly used in transportation facilities. Relationships of material engineering properties to pavement design and performance. Material behavior under cyclic loading.
QP: CE 418 QA: CE 815

838*. Selected Topics in Highway and Airfield Engineering
Fall of odd-numbered years. 1 to 4 credits; May reenroll for a maximum of 6 credits.
P: Approval of department
Selected topics in pavement engineering including: nondestructive deflection testing and back calculation of layer moduli, advanced application of finite element theory in slab design, and fracture mechanics analyses of joint and crack performance.
QP: CE 484

839*. Stabilizing Unbound Granular Materials
Fall of even-numbered years. 3(3-0)
P: CE 432, CE 431 R: Seniors and graduate students
Improving performance and engineering properties of various granular materials through the use of mechanical processes, and chemical/mineralogical additives; characterization of engineering properties of stabilized materials.
QP: CE 418 QA: CE 819

841*. Traffic Flow Theory
Spring. 3(3-0)
P: STAT 361
Microscopic and macroscopic traffic flow models; queueing theory applied to traffic flow analysis; gap acceptance; simulation models for network analysis; intelligent vehicle-highway systems.
QP: STT 351 QA: CE 843

842*. Advanced Airport Systems Design
Fall of odd-numbered years. 3(3-0)
P: CE 442
Analysis and design of airport systems using computer-aided models; design parameters; demand analysis; runway orientation and capacity; airside delay; vehicle processing; passenger processing.
QP: CE 442

843*. Simulation and Optimization of Urban Traffic Flow
Fall of even-numbered years. 3(3-0)
P: STT 351, CE 449, CE 841
Statistical analysis of highway geometric design and operational-control strategies with respect to the optimal flow of traffic; intersection, arterial, network design and control models; traffic simulation; system management and optimization.
QP: CE 441 CE 449 QA: CE 841

844*. Highway and Traffic Safety
Fall of odd-numbered years. 3(3-0)
P: CE 448, STT 452
Analysis of highway geometric design alternatives and operational-control strategies with respect to the probabilities of traffic crashes; statistical methods of pattern identification; countermeasure selection and evaluation methodology; risk management.
QP: CE 483 QA: CE 844

845*. Public Transportation System Planning
Fall of odd-numbered years. 3(3-0)
P: CE 446
Planning and operating urban and rural transportation systems; system technology; budgeting and programming transportation services; transportation system management; environmental impact statement; personnel and demand-responsive systems.
QP: CE 346 QA: CE 845 CE 941

846*. Statewide Transportation Network Evaluation
Fall of even-numbered years. 3(3-0)
P: CE 346
Transportation system measures; needs studies; sufficiency ratings; cost-allocation models; programming and budget constraints; corridor analysis; transportation economics; demand elasticity.
QP: CE 346 QA: CE 846

847*. Travel Demand Analysis
Fall of even-numbered years. 3(3-0)
P: CE 448
Advanced topics in travel demand modeling; disaggregate and behavioral models, error analysis, and model sensitivity; economic investment and analysis in demand context; activity modeling.
QP: CE 448 QA: CE 845

848*. Transportation Research Methods
Spring. 3(3-0)
P: STT 351 or 1 STT course at 400 level
Quantiative methods and apparatus for design for transportation research; emphasis is on application and interpretation of methods including ANOVA, non-parametric, discriminant analysis, factor analysis, multivariate regression; SPSS.
QP: CE 351 QA: CE 849

849*. Special Problems in Civil Engineering
Fall, Spring, Summer. 1 to 4 credits.
May reenroll for a maximum of 9 credits.
P: Approval of department
Research problems of limited scope not pertaining to thesis accomplished under CE 889 or CE 899.
QA: CE 880

850*. Special Topics in Civil Engineering
Fall, Spring, Summer. 2 to 4 credits.
May reenroll for a maximum of 9 credits.
P: Approval of department
Selected topics in new or developing areas of civil engineering.
QA: CE 890

859*. Master's Thesis Research
Fall, Spring, Summer. May reenroll for a maximum of 0 credits.
P: Approval of department
Master's thesis research.
QA: CE 899

902*. Random Vibration of Structural and Mechanical Systems
Spring. 3(3-0)
Interdepartmental with the Department(s) of Mechanical Engineering, Metallurgy, Mechanics, and Materials Science.
P: CE 802 or ME 806, CE 810 or STT 351 or STT 421 recommended
Probabilistic modeling of random excitations (e.g., earthquake, aerodynamic and ocean wave loadings); response of single and multiple degree-of-freedom systems to random excitation; designing against failure; nonstationary and nonlinear problems.
QP: CE 802 ME 823STT 351STT 441 QA: CE 827

904*. Advanced Structural Mechanics II
Spring. 3(3-0)
P: CE 804
Complementary energy; hybrid finite element; elements of theory of plasticity; nonlinear analysis of frames; nonlinear finite elements; computer implementation.
QP: CE 804 QA: CE 890

906*. Advanced Theory of Concrete Composites and Structures
Spring of odd-numbered years. 3(3-0)
P: CE 806
Applications of fracture mechanics and plastic theories to modeling the mechanical behavior of concrete composites and structures; fiber reinforced concrete.
QP: CE 406 QA: CE 905 CE 903
915a. Earth Structures
Fall of odd-numbered years. 3(3-0)
F: CE 912
Design of earth dams and embankments; natural and cut slopes; slope stability analysis; embankments on soft foundations; seepage analysis; instrumentation; earth reinforcement.
QP: CE 917 QA: CE 915

918a. Soil Dynamics
Spring. 3(3-0)
F: CE 912
Vibration fundamentals; wave propagation in soil media; dynamic soil properties; theory and design of foundations for vibratory loads; characteristics of ground motion during earthquakes; soil liquefaction; settlement under transient and repeated loads.
QP: CE 917 QA: CE 916

921a. Advanced Topics in Groundwater
Spring of even-numbered years. 3(3-0)
F: CE 921
Topics in the formulation and use of numerical simulation to understand the physics of flow and contaminant transport in complex settings and the mechanics of immiscible fluids in porous media.
QP: CE 921 QA: CE 921

999a. Selected Topics in Hydraulics
Spring of odd-numbered years. 1 to 3 credits. May enroll for a maximum of 6 credits.
P: Permission of department
Selected topics in advanced fluid mechanics and hydraulics related to civil and environmental engineering.
QP: CE 921 QA: CE 921

999a. Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 12 credits. May enroll for a maximum of 9 credits.
Doctoral dissertation research
QP: CE 998 QA: CE 999

CLASSICAL STUDIES
CLA

120a. English from Latin and Greek Roots
Fall of odd-numbered years. 3(3-0)
Prefixes, suffixes, and roots of English vocabulary from Greek and Latin word elements.
QP: CLA 220 QA: CLA 220

121a. Medical Terminology
Spring of even-numbered years. 3(3-0)
Basic Greek and Latin word elements used in the formation of prefixes, suffixes, and roots.
QP: CLA 221 QA: CLA 221

300a. Greek Civilization
Fall of even-numbered years. 3(3-0)
R: Not open to freshmen.
Political, social, religious, and intellectual life of ancient Greece from the Mycenaean period to the death of Alexander the Great, through such authors as Homer, Herodotus, Aeschylus, Euripides, Aristophanes, Thucydides, and Plato.
QP: CLA 329 QA: CLA 329

310a. Roman Civilization
Spring. 3(3-0)
R: Not open to freshmen.
Enduring features of Roman civilization to Justinian. Political institutions, religion, architecture, literary forms, creative arts, and gender roles.
QP: CLA 327 QA: CLA 327

350a. Greek and Roman Literature in English Translation
Spring of even-numbered years. 3(3-0)
R: Not open to freshmen.
Representative works of major Greek and Roman authors.
QP: CLA 304 CLA 305

400a. Women in Classical Greek Society
Spring of even-numbered years. 3(3-0) Interdepartmental with the Department(s) of Women's Studies.
R: Not open to freshmen and sophomores.
Images, roles, and statuses of women in Greek society as seen through literary sources.
QP: CLA 330

410a. Greek Mythology
Spring of even-numbered years. 3(3-0)
R: Not open to freshmen and sophomores.
Myths as social discourse defining order in Greek culture, as sources of inspiration for poets and thinkers, and as legacy for modern Western culture.
QP: CLA 330 QA: CLA 330

420a. Greek and Roman Religions
Fall of odd-numbered years. 3(3-0)
R: Not open to freshmen and sophomores.
QP: CLA 335 QA: CLA 335

499a. Senior Thesis
Fall, Spring. 3(3-0)
P: LTN 403. R: Approval of department.
Scholarly research and writing with a focus on specific problems, under faculty supervision.
QP: LTN 490

COMMUNICATION ARTS AND SCIENCES

492. Special Topics
Fall, Spring, Summer. 1 to 8 credits. May enroll for a maximum of 16 credits.
R: Approval of department.
Varied topics pertaining to the study of communication processes.
QP: QAS 492 QA: QAS 492

999. Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 9 credits. May enroll for a maximum of 99 credits.
R: students in Mass Media Ph.D. Program (curriculum 98)
Dissertation research for the Ph.D. program in the Mass Media.
QP: CAS 999

COMMUNICATION
COM

100. Human Communication
Fall, Spring, Summer. 3(3-0)
Process and functions of communication. Principles underlying communication behavior. Practice in analyzing communication situations and in speaking and writing.
QP: COM 100

290a. Introduction to Communication Inquiry
Fall, Spring, Summer. 3(3-2)
P: MTH 110 or MTH 116 or designated score on mathematics placement test. 409
Nature and conduct of communication inquiry. Significant questions about communication and understanding answers.
QP: MTH 106 MTH 110 QA: COM 199

225. An Introduction to Interpersonal Communication
Fall, Spring, Summer. 3(3-0)
Principles and practices of interpersonal communication. Emphasis on effective and responsible interpersonal communication.
QP: COM 125

240. Introduction to Organizational Communication
Fall, Spring, Summer. 3(3-0)
Theories, systems, structures and processes of organizational communication. Organizational cultures. Communication in multinational organizations and in individual, leadership, supervisor-subordinate and small group situations.
QP: COM 126 COM 199

315a. Information Gathering and Interpreting Theories
Fall. 3(3-0)
P: COM 200, COM 225. R: Not open to freshmen and sophomores.
Information gathering as a relational process. Interaction through the asking and answering of questions.
QP: COM 125 COM 199

325a. Interpersonal Communication Theory and Research
Fall, Spring. 3(3-0)
Theories, processes and models of interpersonal communication. Topics include conflict resolution, deception, consciousness, and uncertainty reduction in communication.
QP: COM 125 COM 199

340a. Dyadic and Group Processes in Organizations
Fall, Spring. 3(3-0)
P: COM 200, COM 240. R: Not open to freshmen and sophomores. Only open to Communication majors.
Theory and research on dyadic and group relations within organizations. Topics include leadership, motivation, networks, decision making, and organizational taxonomy.
QP: COM 199

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