844. Structural Elucidation by Instrumental Methods
Fall, (3-2-0) Approval of department.
A practical instrumental analysis course with the major emphasis on the interpretation of data rather than a detailed description of the instrument. The fundamental principles behind the various measurements will be discussed in a general way, and important instrumental limitations will be noted.

Fall, (3-0-0) CEM 353; CEM 462 or approval of department.
Organic reactions are presented in a mechanistic framework. Reactions which proceed via carboxylations, carbanions, free radicals, carbene, arynes and other reactive intermediates, and concerted reactions are included.

861. Structure of Organic Compounds
Winter, (3-0-0) CEM 560 or approval of department.
Structural and stereochemical principles will be developed and illustrated. Spectroscopic data will be used to illustrate the principles and to determine structure, with an emphasis on nuclear magnetic resonance spectroscopy.

862. Advanced Synthetic Organic Chemistry
Spring, (3-0-0) CEM 560 or approval of department.
The strategy and methods of organic synthesis will be discussed.

880. Atomic and Molecular Structure
Fall, (3-0-0) CEM 482 or approval of department.
Basic concepts of non-relativistic quantum mechanics will be developed and illustrated. Spectroscopic data will be used to describe the atomic and molecular structure.

881. Thermodynamics
Winter, (3-0-0) Approval of department.
Laws of thermodynamics and their application to pure substances and solutions.

885. Statistical Thermodynamics
Winter, (3-0-0) Approval of department.

924. Selected Topics in Analytical Chemistry
Fall, Winter, Spring, (3-0-0) or (1-1-0) May reenroll for a maximum of 3 credits if different topic is taken.
Among topics which may be discussed are: advances in electroanalytical chemistry or spectroscopy; nonaqueous solvents; complexation equilibria; surface chemistry; analytical chemistry of polymers.

938. Seminar in Analytical Chemistry
Fall, Winter, Spring, 1-1-0) May reenroll for a maximum of 3 credits.
Discussions of recent advances and reports by graduate students on research problems.

956. Selected Topics in Organic Chemistry
Fall, Winter, Spring, (2-2-0) or (3-3-0) May reenroll for a maximum of 12 credits if different topic is taken.
Selection of topics may be from heterocyclic chemistry, natural products, free radicals, carbonium ions, organic sulfur or nitrogen compounds, acidities, oxides, isotope effects, photochemistry and others.

958. Selected Topics in Physical Chemistry
Fall, Winter, Spring, (3-0-0) May reenroll for a maximum of 9 credits if different topic is taken.
Selection of topics may be from quantum mechanics and applications to chemical problems. Selected topics include: spectroscopy, properties of atoms and molecules in electric and magnetic fields, and theories of molecular electronic structure.

988. Seminar in Physical Chemistry
Fall, Winter, Spring, (1-1-0) May reenroll for a maximum of 3 credits.
Discussions of recent advances and reports by graduate students on research problems.

999. Doctoral Dissertation Research
Fall, Winter, Spring, Year. Variable credit. Approval of department.
Research in analytical, inorganic, organic, and physical chemistry.

CHINESE
See Linguistics and Germanic, Slavic, Asian and African Languages.

CIVIL AND ENVIRONMENTAL ENGINEERING

College of Engineering

Civil Engineering

(3-0-0) Engineering majors or approval of department.

251. Elementary Surveying
Spring, (4-3-0) Not open to majors.
Use of the tape, compass, level, and transit with simple maps. Traverse closure and area computations. Profile, cross section and stadia surveys. U.S. Land system.

252. Surveying 1
Fall, Spring, (5-4-3) Engineering majors or approval of department.

259. Introduction to Environmental Engineering
Fall, Winter, Spring, (4-4-0) CEM 141, or CEM 130, MTH 112, CPS 120.
Hydrology, ground water and surface water supply systems; wastewater treatment; methods of pollution control for solid waste, air, and noise.

305. Structural Analysis
Fall, Winter, Spring, (3-0-0) CIV 211.
Stability and determinacy; linearity. Plane trusses: shear and bending in beams and frames. Virtual work calculation of forces and displacements in statically-determinate plane structures.

306. Structural Analysis II
Winter, Spring, (3-0-0) CIV 305.
305. Engineering Materials I  
Fall, Winter, Spring. 4(3-3) MTH 211 or concurrently. 
Structure; composition; physical, mechanical and rheological properties of non‐metallic construction materials. Emphasis on aggregates, asphalt, inorganic cements, concrete, and wood. 

312. Soil Mechanics  
Winter, Spring, Summer. 4(3-3) MTH 211. 
Engineering properties of soils and their measurement. Effective stress concept; permeability; fluid flow in soils; stress‐strain behavior; soil strength, compaction and consolidation of soils; field exploration and design problems. 

321. Introductory Fluid Mechanics  
Fall, Winter. 4(3-2) MTH 210. 
Fluid properties; hydrostatics; control volume approach to conservation of mass, momentum and energy; dimensional analysis and dynamic similarity; fluid resistance; pipe and open channel flows; boundary layer concepts. 

346. Transportation  
Winter, Spring, Summer. 4(4-0) MTH 113. Planning, design, and evaluation of transportation systems; highway, street, and intersection capacity; basic elements of geometric design. 

347. Geometric Design of Highways  
Fall, Winter. 4(3-3) C E 346 or concurrently. Geometric design of streets and highways as related to capacity, construction costs, and safety. State and national design standards and practices. 

370. Cost and Optimization Engineering  
Fall, Winter. 3(3-0) MTH 112. Formulation of engineering decisions governed by current and future costs and returns. Comparison and optimization of alternative engineering projects, products and processes. 

372. Construction Estimating  
Fall, Spring. 3(3-0) Juniors. Cost studies of construction activities with emphasis on labor productivity and operating characteristics of equipment under various site conditions. Interpretation of drawings and specifications. 

374. Legal Aspects of Engineering  
Spring. 3(3-0) Juniors. The professional engineer's relationship with the legal aspects of engineering. Special emphasis on contract documents. 

390. Civil Engineering Analysis  
Fall, Spring. 3(2-3) MTH 310, CPS 120. Analysis of civil engineering problems by numerical methods. Use of microcomputers to analyze problems. Technical reports to present methods and computed results. 

392. Civil Engineering Fundamentals for Planners  
Winter. 4(4-0) Junior Urban Planning and Landscape Architecture majors. Site planning; utility systems; subdivision review including street design, grading, density, and costs; transportation planning; and project evaluation. 

400. Structural Mechanics I  
Fall. 4(4-0) C E 306, C E 390. Miscellaneous topics in displacement calculation by virtual work. Matrix formulation of the general principles of framed structural analysis. Exhaustive study of the flexibility and stiffness methods. 

405. Structural Design in Steel  
Fall, Winter. 4(4-0) C E 306 or concurrently, C E 390. Beams, columns, tension and compression members, connections. Elastic, plastic and ultimate strength concepts. 

406. Structural Design in Concrete  

407. Structural Design Concepts  
Spring. 3(3-0) C E 405, C E 406. Develop and expand design concepts through study, investigation and project design of various structural systems. Criteria for material selection and creation of unusual structural systems pursued. 

410. Structural Mechanics II  
Winter. 4(4-0) C E 405, CPS 120. Continuation of C E 400. Matrix analysis of framed structures. Introduction to inelastic behavior of structures. Use of programmed computer solution techniques. 

418. Foundation Engineering  
Fall. 3(3-0) C E 312, C E 390. Bearing capacity and settlement of shallow foundations; analysis and design of single piles and pile groups; stress distribution in soil masses; site investigation, data evaluation for field and laboratory tests. 

419. Stability of Soil Masses  
Winter. 3(3-0) C E 312, C E 390. Stability of natural and cut slopes; design of embankments and fills; soil placement and compaction; seepage through soil masses; slope stabilization techniques; lateral earth pressures, retaining walls, and braced excavations. 

421. Hydrology I  
Fall. 4(3-2) C E 280, C E 321, C E 390. Engineering hydrology: frequency and precipitation analysis; streamflow analysis and the unit hydrograph; flood prediction; rainfall‐runoff correlations; urban hydrology. 

422. Open Channel Flow I  
Winter. 4(3-2) C E 331 or M E 333, C E 390 or M E 351. Fundamentals of free surface flow; steady uniform and nonuniform concepts; energy and momentum principles; subcritical and supercritical regimes; gradually and rapidly varied flows; design applications; laboratory assignments. 

423. Closed Conduit Hydraulics  
Spring. 3(2-2) C E 321 or M E 333, C E 390 or M E 351. Steady flow in piping; numerical analysis of pipe networks; theory of turbomachinery; fluid measurements; design of water supply systems; introduction to unsteady flow; laboratory assignments. 

441. Highway Operations  
Fall. 3(3-0) C E 346, STT 351 or approval of department. 

442. Air Traffic Planning and Design  
Fall, Spring. 3(2-2) C E 346. The planning and design of the components of the airport system including ground access facilities, aircraft characteristics, the air traffic control system; airport configuration; capacity analysis; management systems. 

443. Transportation Planning  
Winter. 3(3-0) C E 346 or C E 392; STT 351 or approval of department. Urban transportation facilities needs and programs. Design of transportation models for urban highways and public transit including trip generation, trip distribution, mode split and traffic assignment. Transport agencies function and services. 

444. Highway Engineering  
Spring. 4(3-3) C E 368, C E 347. Design concepts of roadways, facilities, drainage and pavement design. Maintenance, construction and supervision methods and procedures. 

471. Scheduling Construction Activities  
Winter. 3 credits. Approval of department. Techniques for coordinating and controlling construction projects. Scheduling under the constraints of deadlines, uncertain time estimates and limited resources. Computer programs and data files for effective management. 

481. Water and Wastewater Analysis  
Fall. 4(3-3) C E 280, STT 351. Quantitative analysis: bacteriologic and chemical characteristics of water and wastewater; principles of softening, iron removal, coagulation and chlorination; laboratory examination of water and wastewater including turbidity, solids, coliforms, chlorine, etc. 

483. Water and Wastewater Treatment  
Winter. 4(3-3) C E 280, C E 321 or concurrently, C E 390. Water treatment theory and design including sedimentation, coagulation, softening, iron removal and chlorination; wastewater treatment theory and design including grit chambers, activated sludge, trickling filter, and anaerobic digesters. 

485. Environmental Health Engineering  
Spring. 4(3-2) MPH 200, C E 320, C E 321 or concurrently, STT 351. Design of small water, waste water and solid waste facilities. Epidemiology of communicable disease transmission by air, water, food and arthropods. Engineering measures to control disease spread. 

494. Civil Engineering Design Project  
Fall, Winter, Spring. 3(2-2) May reenroll for a maximum of 6 credits. Seniors, approval of department. Planning, specifications and design of a civil engineering project or facility.
499. Civil Engineering Projects
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 6 credits. Approval of department

Original engineering problem of specific interest to the student and a faculty member. Student's proposal describing problem required prior to approval.

801. Structural Modeling and Experimental Methods
Fall. 3(3-0) C E 406, MMM 405 or approval of department.

802. Structural Dynamics I
Fall. 3(3-0) C E 405, C E 406, or approval of department.
Basic concepts in structural dynamics; dynamic loading on structures due to blasts and earthquakes; dynamic properties of structures; methods of analysis; design approach to blast and earthquake resistant structures; dynamic behavior of bridges and other topics.

804. Advanced Structural Theory I
Winter. 4(4-0) C E 400, or approval of department.

805. Advanced Reinforced Concrete
Winter. 3(3-0) C E 406.
Analysis and design of two-way slabs, floor systems, deep beams, shear walls and footings. Limit state, yield line and deflection analysis. Continuity, tall buildings and seismic design. Torsion.

809. Prestressed Concrete Design
Spring. 3(3-0) C E 406.

809. Finite Element Method
Fall. 4(4) Approval of department.
Interdepartmental with the departments of Metallurgy, Mechanics, and Materials Science.
Theory and application of the finite element method to the solution of continuum type problems in heat transfer, fluid mechanics and stress analysis.

812. Rock Mechanics
Fall of odd-numbered years. 3(3-0) MMM 211, C E 112.

815. Principles of Highway and Airport Soils
Fall. 4(4-0) C E 347.
Foundation problems related to highways and airports, relation of subsoil conditions to design and construction, analytical review of laboratory and field results.

817. Mechanical Properties of Soils
Fall. 4(3-3) C E 419 or approval of department.
Mechanical properties of soil including stress-strain behavior, conditions of failure and shear strength; consolidation theory and permeability. Laboratory determination of soil properties including interpretation of experimental data for use in practice.

818. Advanced Soil Mechanics
Winter. 4(4-0) C E 419; C E 817 recommended.
Foundations and earth retaining structures; bearing capacity, lateral resistance and settlement of deep foundations; earth pressures on braced excavations and sheet pile walls; design of caissons and cofferdams.

819. Soil Stabilization in Geotechnical Engineering
Summer. 3(3-0) C E 419.
Techniques to improve the performance of soil in engineering applications: compactions, blending, admixtures, grouting, electroosmosis, vibroflotation, compaction piles, thermal, load bearing and hydraulic fills, precompensation, reinforced earth.

820. Geotechnical Engineering for Cold Regions
Spring. 3(3-0) C E 419 or approval of department.
Physical and thermal properties of ice and frozen soils; ground thermal regime; mechanical properties of frozen ground; thaw consolidation problems; foundation design; slope stability problems; and artificial freezing for construction.

821. Porous Media Flow I
Fall. 3(3-0) C E 422 or approval of department.

823. Hydrology II
Winter of even-numbered years. 3(3-0) C E 421, C E 422, STT 351 or approval of department.

824. Coastal Engineering
Fall of even-numbered years. 3(3-0) C E 422 or approval of department.

826. Environmental Fluid Mechanics I
Winter of even-numbered years. 3(3-0) C E 422 or approval of department.
Fundamentals: the convective-diffusion equation; solution methods; analytical solutions; simplified solutions; numerical modeling. Molecular diffusion; momentum, mass and heat transport; turbulent diffusion; the effects of stratification.

827. Environmental Fluid Mechanics II
Winter of odd-numbered years. 3(3-0) C E 826 or approval of department.
Continuation of C E 826 showing adaptation of theoretical tools to describe transport in environments selected from the following: rivers, lakes, estuaries, groundwater, the atmosphere, nearfield regions. Physical modeling.

828. Open Channel Flow II
Spring. 3(3-0) C E 422 or M E 333 or approval of department.
Advanced topics in steady flow analysis. Unsteady flow phenomena; method of characteristics, propagation of discontinuities; gradually and rapidly varied unsteady flow analysis; computer based design applications.

829. Fluid Transients
Fall. 3(3-0) M E 333 or approval of department. Interdepartmental with the Department of Mechanical Engineering.
Application of unsteady flow concepts and wave mechanics to hydraulic engineering; method of characteristics, waves and waterhammer in piping systems; resonance phenomena.

830. Intermediate Fluid Mechanics
Fall. 3(3-0) M E 332 or C E 221. Interdepartmental with and administered by the Department of Mechanical Engineering.
Deformable control volumes, Navier-Stokes equations, dimensionless variables, vorticity and circulation, turbulent flow, inviscid flow, and boundary layer theory.

840. Pavement Design
Spring of even-numbered years. 3(3-0) C E 449 or approval of department.
Pavement types and wheel loads, stresses in flexible pavements, stresses in rigid pavements, pavement behaviors under loadings; climate effects on pavement performance, evaluating subbase strengths, subgrades, and pavement design criteria.

841. Optimization of Urban Traffic Flow
SY 441). Fall of even-numbered years. 3(3-0) C E 346, STT 351 or approval of department. Interdepartmental with Systems Science.
Traffic flow models used in design of computerized traffic control systems. Optimal freeway ramp metering algorithms. Offline and online optimization of traffic signal timing.

842. Pavement Rehabilitation
Spring of odd-numbered years. 4(4-0) C E 448 or approval of department.
Strengthening existing pavements, pavement overlay design criteria, epoxy and polyester resin repair and rehabilitation, evaluation of reseal facing practices for bituminous and cement pavements.

843. Traffic Engineering Characteristics
Winter. 3(3-0) C E 346, STT 351 or approval of department.
Safety analyses, flow and capacity characteristics, statistical properties of traffic, queuing characteristics at intersections, delay characteristics and analyses.

844. Highway and Traffic Safety
Spring of odd-numbered years. 3(3-0) C E 542.
Highway safety improvement programs; identification of hazardous locations; selection and evaluation of countermeasures; programming improvements.
845. Environmental Impacts of Transportation Facility Design Decisions
Spring of even-numbered years. 3(0-0) C E 346 or C E 392, C E 445, or approval of department.
The context in which current transportation planning and design decisions are made; legislation; socio-economic effects; air, noise, and water pollution. Preparation of environmental impact statements.

846. Statewide Transportation Planning
Fall of odd-numbered years. 3(3-0) C E 346 or approval of department.
Highway inventory, road use studies and programming, analysis of highway costs, economic considerations in location and design.

847. Advanced Geometric Design of Highways
Winter of even-numbered years. 3(3-0) C E 347.
Advanced geometric design of highways and freeways, including the redesign of existing systems with development and evaluation of geometric alternatives.

848. Travel Demand Forecasting
Fall of even-numbered years. 3(3-0) C E 448.
Advanced topics in travel demand; disaggregate and behavioral models, error analysis, and model sensitivity.

849. Design of Research Programs I
Spring, 2(2-0) Approval of department. To receive credit C E 849 and C E 850 must be completed satisfactorily except by prior arrangement with instructor.
Two term sequence to design a major research program not thesis related, e.g., response to a request for a proposal. Includes experiment design, detailed literature review and synthesis.

850. Design of Research Programs II
Summer, 2(2-0) C E 849. To receive credit C E 849 and C E 850 must be completed satisfactorily except by prior arrangement with instructor.
Continuation of C E 849.

851. Special Problems in Civil Engineering
Fall, Winter, Spring, Summer. 1 to 6 credits. May reenroll for a maximum of 12 credits in C E 880 and S E 880 combined. Approval of department.
Research problems of limited scope not pertaining to thesis accomplished under C E 899 or C E 993.

852. Special Topics in Civil Engineering
Fall, Winter, Spring, Summer. 2 to 4 credits. May reenroll for a maximum of 6 credits. Approval of department.
Selected topics in new or developing areas of civil engineering.

853. Master's Thesis Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

854. Advanced Theory and Design of Reinforced Concrete II
Spring, 3(3-0) C E 805.
Continuation of C E 805 with application of theory to analysis and design of tanks, rigid frames, and shells.

906. Advanced Structural Steel Design
Spring, 3(3-0) C E 406.
Analysis and design of multiple-story building frames; continuous trusses and rigid-frame girder bridges in structural steel. Plastic design.

907. Elastic Thin Shells
Spring, 4(4-0) C E 804 or MMM 815 or approval of department; MTH 421. Interdepartmental with the Department of Metallurgy, Mechanics, and Materials Science.
Elements of differential geometry, membrane theory of shells, Pucher's stress function, deformation and bending of shells of revolution and shallow shells.

912. Theory of Plates
Winter, 4(4-0) C E 804 or MMM 815 or approval of department; MTH 422. Interdepartmental with and administered by the Department of Metallurgy, Mechanics, and Materials Science.
Bending of thin elastic plates with various shapes and boundary conditions; application of energy principles and approximate methods of solution; thick plates, large deflection theory; sandwich plates.

915. Earth Structure
Winter, 3(3) C E 817 or approval of department.
Embankments, earth dams, natural and cut slopes, stability of circular and composite slip surfaces; performance of embankments on soft foundations; seepage through earth dams; instrumentation for field performance evaluation.

916. Soil Dynamics
Spring, 4(4-0) C E 817 or approval of department.
Characteristics of ground motions during earthquakes; dynamic soil properties; liquefaction and settlement under transient and repeated loadings; foundation design for vibratory loads; wave propagation in soil media.

921. Porous Media Flow II
Winter of odd-numbered years. 3(3-0) C E 809, C E 821.
Mathematical formulations for unsteady groundwater flows and convection/dispersion phenomena. Emphasis placed upon finite-difference and finite-element solution techniques, computer based analysis of field data, and design applications.

941. Urban Public Transport: Issues and Technology
Fall of odd-numbered years. 3(3-0) Approval of department.
Planning and operating urban transportation systems; system technology. Regional and rapid rail systems, light rail, buses, paratransit, transportation system management.

999. Doctoral Dissertation Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

Environmental Engineering

800. Environmental Engineering Seminar
(S E 808.) Fall, Winter, Spring, 1(1-0) May reenroll for a maximum of 3 credits. Graduate major in C E or ENE.
Current research, reports, and literature reviews.

801. Dynamics of Environmental Systems
Fall, 4(4-0) CEM 561, C E 481.
Thermodynamics, kinetics, and mass transfer of environmental transformations. Environmental modeling, systems analysis, reactor theory, and process design. Applications to air, water and soil pollution, waste treatment, and hazardous waste management.

802. Physical Chemical Processes of Environmental Engineering
(S E 802.) Winter, 5(4-2) C E 483.
Analysis of physical and chemical principles which form the basis of air and water pollution control and solid waste disposal; process dynamics, sedimentation, coagulation, filtration, adsorption, absorption, oxidation.

804. Biological Processes of Environmental Engineering
(S E 804.) Winter, 4(4-0) MPH 200, ENE 802.
Aerobic and anaerobic degradation of liquid and solid wastes. Biochemical reactions; activated sludge trickling filter kinetics; sludge digestion and composting.

805. Biological Waste Treatment Laboratory
(S E 805.) Spring, 1(0-3) ENE 804.
Treatability studies to develop parameters for design of biological waste treatment systems; reactor kinetics; oxygen uptake; sludge settling rate; biomass production.

816. Hazardous and Industrial Waste Management
(S E 816.) Fall, 3(3-0) Approval of department.
RCRA; waste and process survey, sampling and analysis; treatability studies; process modification; advanced treatment processes; case studies; field trips to industrial sites required.

822. Air Resource Management
(S E 822.) Spring of even-numbered years. 4(4-0) ENE 822.
Characteristics of air contaminants and noise; sources and source inventory; micrometeorology and pollutant transport; pollutant effects, introduction to sampling and control.

832. Solid Waste Management
(S E 832.) Spring of odd-numbered years. 4(4-0) C E 485 or approval of department.
Generation rates; storage; collection; transfer and transport; processing; recovery; landfill; siting; design; operation; closure and monitoring; hazardous waste.

859. Special Problems in Environmental Engineering
(S E 880.) Fall, Winter, Spring, Summer. 1 to 6 credits. May reenroll for a maximum of 12 credits in C E 880 and ENE 880 combined. Approval of department.
Research problems of limited scope not pertaining to thesis accomplished under C E 899 or C E 993.

999. Master's Thesis Research
(S E 896.) Fall, Winter, Spring, Summer. Variable credit. Approval of department.
Descriptions — Civil and Environmental Engineering
of Courses

999. Doctoral Dissertation Research
(Fall, Winter, Spring, Summer. Variable credit. Approval of department.)

CLASSICAL STUDIES
See Romance and Classical Languages.

COMMUNICATION COM

College of Communication Arts and Sciences

100. Human Communication
Fall, Winter, Spring, Summer. 3(3-0).
Principles and practice in the management of communication systems, with emphasis on conflict resolution, information exchange, innovation, and information management.

115. Oral Communication
Fall, Winter, Spring, Summer. 3(3-0).
Principles and practice in adapting to audiences, creating and structuring messages, and developing effective delivery of formal and informal speeches. Critical evaluation of speeches by instructor and peers.

125. Interpersonal Communication
Fall, Winter, Spring, Summer. 3(3-0).
Studies students' abilities to become more effective, responsible participants in interpersonal communication relationships, with emphasis on relating communicatively with others.

199. Methods of Inquiry
Fall, Winter, Spring, Summer. 3(3-0).
Major theoretical orientations toward communication. Primary tools of scholarly inquiry.

205. Persuasion
Fall, Winter, Spring, Summer. 4(4-0).
Process of influencing human behavior through persuasive communication. Experience in creating persuasive messages and in evaluating the acceptability of persuasive attempts.

210. Leadership and Group Communication
Fall, Winter, Spring, Summer. 4(4-0).
Principles and practice in the utilization of communication for effective leadership, with special emphasis on group communication.

250. Argumentation
Fall, Winter, Spring. 4(4-0).
Principles and practice in argumentation: methods of coaching debate and individual events and managing tournaments; observation of high school tournaments, practices, and student congress.

299. Individual Projects
Fall, Winter, Spring, Summer. 1 to 15 credits. May reenroll for a maximum of 15 credits. Approval of project proposal by department. Independent research, experience in communication laboratories, or tutorial work in communication skills.

300. The Effects of Mass Communication
Fall, Winter, Spring, Summer. 4(4-0).
Principles and practice in adapting to audiences, creating and structuring messages, and developing effective delivery of formal and informal speeches. Critical evaluation of speeches by instructor and peers.

315. Organizational Communication
Fall, Winter, Spring, Summer. 4(4-0).
Principles and practice in the management of communication systems, with emphasis on conflict resolution, information exchange, innovation, and information management.

326. Communication in Business
Fall, Winter, Spring, Summer. 4(4-0).
Study and analysis of business and industrial communication problems; extensive instruction and practice in writing.

350. Signs and Sign-Behavior
Fall, Winter, Spring, Summer. 4(4-0).
Principles and practice in adapting to audiences, creating and structuring messages, and developing effective delivery of formal and informal speeches. Critical evaluation of speeches by instructor and peers.

399. Special Topics in Communication
Fall, Winter, Spring, Summer. 4(4-0).
May reenroll for a maximum of 3 credits. Approval of project proposal by department.

405. Quantitative Strategies in Communication Research
Fall, Spring. 4(4-0).
Design and statistical strategies in communication research. Project design and evaluation schema. Basic data handling and presentation.

410. Classroom Communication
Spring. 3(3-0).
Classroom as a communication system with emphasis on operationalizing philosophies of education in the environment, teacher and student roles and styles, affective and cognitive interactions, methods of systematic observation.

411. Directing the Debate and Forensic Program
Fall. 3(3-0).
Principles and practice in argumentation: methods of coaching debate and individual events and managing tournaments; observation of high school tournaments, practices, and student congress.

413. Seminar in Communication Education
Winter, Summer. 4(4-0).
Philosophies of curricular and co-curricular programs in communication education. Internship experience in those programs.

425. Communication Campaign Analysis
Fall. 4(4-0).
Design of persuasive and information campaigns. Techniques and strategies for analyzing and influencing mass audience. Principles and practice in constructing messages and selecting media. Political and public service campaign focus.

430. Information and Technology
Winter. 4(4-0).
Concepts and principles of information and information technology, with emphasis on effects on organizational processes.

431. Conflict in Communication
Winter. 4(4-0).
Elaboration of theories in conflict resolution, development of strategies to resolve conflict situations, personal analysis of communication patterns that can affect conflict.

450. Fund-Raising and Grant Writing
Fall of even-numbered years. 4(4-0).
Fund raising for nonprofit organizations: corporate, individual, and foundation giving. Grant writing.

460. Critical Perspectives on Communication
(360.) Fall, Winter, Spring. 4(4-0).
Interdependence of communication and other societal factors, emphasizing criteria for ethical and social appropriateness.

475. Relational Communication
Spring. 4(4-0).
Theories and current research on relational communication, including stages of relational communication development; verbal and nonverbal relational messages of intimacy, similarity, arousal, privacy and dominance; role of culture and context.

499. Special Projects
Fall, Winter, Spring, Summer. 1 to 15 credits. May reenroll for a maximum of 15 credits. Approval of project proposal by department. Independent research, group research, student-directed group projects.

505. Communication Research
Fall. 4(4-0)
First year graduate majors.

Communication research strategy; methodology. Scientific process, bases for derivation and verification of hypotheses, and basic methods of designing research in communication.

805. Communication Research
Fall. 4(4-0) COM 805; second year graduate majors.
Continuation of COM 805.