

**848. Transportation Models**

Spring. 3(3-0) 448.

Analysis of transportation modeling process, including error propagation and parameter sensitivity analysis. Comparative attributes of zonal size and model sequence decisions on the evaluation of system alternatives.

**880. Special Problems in Civil Engineering**

Fall, Winter, Spring, Summer. Variable credit. Approval of department.

Research problems of limited scope not pertaining to thesis accomplished under 899 or 999.

**899. Research**

Fall, Winter, Spring, Summer. Variable credit. Approval of department.

**905. Advanced Theory and Design of Reinforced Concrete II**

Spring. 3(3-0) 805.

Continuation of 805 with application of theory to analysis and design of tanks, rigid frames, and shells.

**906. Advanced Structural Steel Design**

Spring. 3(3-0) 406.

Analysis and design of multiple-story building frames, continuous trusses and rigid-frame girder bridges in structural steel. Plastic design.

**909. Elastic Thin Shells**

Spring. 4(4-0) 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, Fucher's stress function, deformation and bending of shells of revolution and shallow shells.

**912. Theory of Plates**

Winter. 4(4-0) 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 Structures**

Spring. 3(3-0) 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**

Winter. 3(3-0) 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.

**941. Mass Transit Routing and Scheduling**

Fall of even-numbered years. 3(3-0) 848 or approval of department.

Routing algorithms for mass transit vehicles in urban networks; dispatching of vehicles by dynamic programming and other algorithms; variable headway, variable route transit system studies.

**999. Research**

Fall, Winter, Spring, Summer. Variable credit. Approval of department.

**Sanitary Engineering**

S E

**802. Physical Chemical Processes of Environmental Engineering**

Fall. 4(3-3) C E 481 or concurrently.

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**

(906.) Winter. 5(4-3) MPH 200, C E 280, S E 802.

Aerobic and anaerobic degradation of liquid and solid wastes. Biochemical reactions; activated sludge and trickling filter kinetics; sludge digestion and composting.

**812. Water Treatment Plant Design**

(805.) Winter. 4(3-3) C E 370, 483, 828, S E 802.

Theory and design of water treatment processes. Coagulation and flocculation; softening; sedimentation; filtration; disinfection.

**814. Wastewater Treatment Plant Design**

(806.) Spring. 4(3-3) C E 370, 483, 828, S E 804.

Theory and design of wastewater treatment processes. Racks, screens, sedimentation basins, trickling filters, aeration tanks, digesters.

**816. Treatment of Industrial Wastes**

(803.) Spring. 3(3-0) 804.

Theory of industrial waste management. Application of physio-chemical and biological treatment to selected industries. Examples include: apparel; food processing; materials processing and chemical industry.

**822. Air Resource Management**

Fall of even-numbered years. 4(4-0) 802 or concurrently.

Characteristics of air contaminants and noise; sources and source inventory; microclimatology and pollutant transport; pollutant effects, introduction to sampling and control.

**899. Research**

Fall, Winter, Spring, Summer. Variable credit. Approval of department.

**922. Air Pollution Control**

Winter of odd-numbered years. 4(3-3) C E 321; S E 802, 822.

Application of physical and chemical principles to control of gaseous and particulate air pollutants. Cyclones, bag houses, electrostatic precipitators, adsorption, absorption, combustion.

**924. Air Sampling and Analysis**

Spring of odd-numbered years. 4(3-3) 922.

Theory and design of air sampling programs. Quantitative analysis of ambient air samples and stack samples. Analysis for sulfur oxides, nitrogen oxides and particulates.

**999. 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 I**

Fall, Winter, Spring, Summer. 3(3-0)

Process and functions of communication. Principles underlying communication behavior. Practice in analyzing communication situations and in speaking and writing.

**101. Human Communication II**

Fall, Winter, Spring, Summer. 3(3-0)

Continuation of 100, with greater emphasis on speaking and writing, and on analyzing increasingly complex communication situations.

**115. Oral Communication**

Fall, Winter, Spring, Summer. 3(3-0) 100 or approval of department.

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.

**199. Methods of Inquiry**

Fall, Winter, Spring, Summer. 3(3-0) Majors and minors only. 101.

Major theoretic orientations toward communication. Primary tools of scholarly inquiry.

**205. Persuasion**

Fall, Winter, Spring, Summer. 4(4-0) 101.

Process of influencing human behavior through persuasive communication. Experience in creating persuasive messages and in evaluating the acceptability of persuasive attempts.

**210. Leadership**

Fall, Winter, Spring. 4(4-0) 100.

Principles and practice in the utilization of communication for effective leadership.

**299. Individual Projects**

Fall, Winter, Spring, Summer. Variable credit. May re-enroll for a maximum of 15 credits. 199, approval of project proposal by department.

Independent research, experience in communication laboratories, or tutorial work in communication skills.

**300. The Effects of Mass Communication I**

Fall, Winter, Spring, Summer. 4(3-0) Majors must enroll in 300R concurrently.

Major social effects of mass media on audience behavior. Political communication. Media effects on children. Message strategies producing attitude change. Interrelationship between mass media and interpersonal communication. Decision making in mass media.

**300R. Effects of Communication II**

Fall, Winter, Spring, Summer. 1 credit. Majors. 300 concurrently.

In-depth consideration of effects of communication.

†Name changed effective July 1, 1975. Formerly College of Communication Arts.

**Descriptions — Communication  
of  
Courses**

**315. Organizational Communication**  
Spring. 4(4-0) 101.

Principles and practice in the management of communication systems, with emphases on conflict resolution, information exchange, innovativeness, and information management.

**326. Communication in Business**  
(BIO 326.) Fall, Winter, Spring, Summer. 4(4-0) Juniors.

Study and analysis of business and industrial communication problems; extensive instruction and practice in writing.

**350. Signs and Sign-Behavior I**  
Fall, Winter, Spring, Summer. 4(4-0) 100; majors must enroll in 350R concurrently. Theories of man's symbolic behaviors. Semiotics and general semantics.

**350R. Signs and Sign-Behavior II**  
Fall, Winter, Spring, Summer. 1 credit. Majors. 350 concurrently. In-depth consideration of signs and sign behavior.

**351. Message Analysis**  
Winter. 4(4-0) 350.

Methods of describing messages and message codes, with emphasis on the concept of information.

**352. Non-Verbal Communication**  
Spring. 4(4-0) 350.

Continuation of 351, with emphasis on non-verbal codes: gesture, expression, time and space, light.

**360. Critical Perspectives on Communication**  
Fall, Winter, Spring. 4(3-0) 100.

Interdependence of communication and other societal factors, emphasizing criteria for ethical and social appropriateness.

**399. Special Topics in Communication**  
Fall, Winter, Spring, Summer. 4(4-0) May re-enroll for a maximum of 8 credits. Juniors. Contemporary issues in communication.

**405. Quantitative Strategies in Communication Research**  
Fall, Spring. 5(5-0) Seniors.

Design and statistical strategies in communication research. Project design and evaluation schema. Basic data handling and presentation.

**410. Classroom Communication**  
Spring. 3(3-0) Majors and minors or approval of department.

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) Major and minors or approval of department.

Principles of 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) ED 327.

Philosophies of curricular and co-curricular programs in communication education. Internship experience in those programs.

**420. Message Design**  
Winter. 4(4-0) 101.

Principles and practice in message-media construction and selection.

**499. Special Projects**  
Fall, Winter, Spring, Summer. Variable credit. May re-enroll for a maximum of 15 credits. Approval of project proposal by department.

Independent research, group research, student-directed group projects.

**805. Communication Research**  
Fall. 5(4-2) Majors.

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

**806. Communication Research**  
Winter. 4(5-0) 805.

Continuation of 805.

**815. Organizational Communication**  
Winter, Spring. 4(4-0)

Structure and function of communication in organizations, with emphasis on concepts and principles needed for effective management of organizational communication processes.

**820. Communication Theory and Process**  
Fall, Summer. 3(3-0)

Theoretic models of communication, with emphasis on the applications of communication theory to various professional communication areas.

**821. Mass Communication Theory and Research**  
Fall, Spring. 4(4-0)

Current behavioral science theories and research, e.g., media institutions, decision-making, mass media exposure patterns, diffusion of news and influence, effective message strategies, political communication, and mass media in socialization.

**822. Interpersonal Communication**  
Winter, Summer. 4(3-0)

Current theories and research in interpersonal communication with emphasis on persuasion. The role of interpersonal communication in such processes as conflict resolution and information exchange will be considered.

**828. Cross-Cultural Communication**  
Winter, Spring, Summer. 4(4-0)

Role of communication in the economic, social and political development of less developed countries. Problems in communicating across cultural boundaries.

**830. Nonverbal Communication**  
Fall. 4(4-0)

A review of theory and empirical research on nonverbal communication with implications for application.

**850. Seminar in Research Utilization**  
Winter, Summer. 4(3-0) May re-enroll for a maximum of 8 credits. Approval of department.

Applications of communication research to professional practice in such areas as teaching, change agencies, information system management, etc.

**870. Communication and Change: The Diffusion of Ideas and Information**  
Fall, Spring. 4(4-0)

Research traditions underlying the diffusion of ideas and information, and acceptance of innovation and change. Strategic principles for introduction of change through the use of communication.

**890. Special Problems**  
Fall, Winter, Spring, Summer. 1 to 6 credits. Approval of department. Special problems as arranged with instructor.

**899. Research**  
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

**905. Communication Research Design**  
Fall, Winter, Spring. 5(4-2) May re-enroll for a maximum of 15 credits. 806.

Methods of data collection and analysis in communication research. Designing exploratory studies of the communication process. Interviewer training and bias. Content analysis of the mass media. Writing and critiquing research reports.

**940. Seminar in Communication Theory and Research**  
Fall, Winter, Spring, Summer. Variable credit. May re-enroll for a maximum of 45 credits. Approval of department. Theoretic and research issues in communication.

**990. Special Problems**  
Fall, Winter, Spring, Summer. 1 to 6 credits. Approval of department.

**COMMUNICATION ARTS AND SCIENCES\* CAS (COLLEGE OF)**

**492. Special Topics**  
Fall, Winter, Spring, Summer. 3 to 5 credits. Approval of department.

Varied topics pertaining to the study of communication processes.

**892. Special Topics**  
Fall, Winter, Spring, Summer. 3 to 5 credits. Approval of department.

Varied topics pertaining to advanced study of communication processes.

**999. Research**  
(COM 999.) Fall, Winter, Spring, Summer. Variable credit. Approval of department.

Dissertation research for the doctoral programs in Communication and in Mass Media.

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