969. *Quantitative Methods in Educational Research*

B. Advanced Quantitative Methods in Educational Research.

Fall, Winter, Spring, Summer. 4(3-2) 869.

Principles and techniques in the application of inferential statistics to educational data with emphasis on the analysis of variance. Overview of correlation methods, non-parametric procedures and multi-variate techniques.

C. Experimental Design in Education.

Winter, Spring, Summer. 4(3-2) 969B.

Theory and practice in the design, analysis, and interpretation of experimental and quasi-experimental research.

982. *Seminars in Education*

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

Seminars in the various fields of emphasis.

983. *Readings and Independent Study in Education*

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

Study on an individual or group basis in the various fields of emphasis.

984. *Laboratory and Field Experience in Education*

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

Supervised advanced graduate practicums, observation, internships, and externships in the various areas of emphasis.

999. *Research*

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

ELECTRICAL ENGINEERING AND SYSTEMS SCIENCE*

College of Engineering

Electrical Engineering — E E

305. *Introduction to Electromagnetic Theory*

Fall, Winter. 4(4-0) MTH 215, PHY 288.

Vector analysis; electrostatic fields and sources; scalar potential; Poisson's and Laplace's equations; dielectric media; capacitance; energy storage; boundary value problems in electromagnetic fields.

306. *Electromagnetic Fields and Waves*

Winter, Spring. 4(4-0) 305.

Magnetostatic fields and sources; vector potential; magnetic media; inductance; energy storage; time-varying fields; Maxwell's equations; energy conservation; potential theory; radiation concepts, plane waves, skin-effect, surface impedance.

311. *Fundamentals of System Modeling*

Fall, Winter. 4(4-0) MTH 334; PHY 288.

System measurements; signal representations; mathematical models for systems of lumped physical components, Kirchhoff's laws; linearity; impulse response; phasors, sinusoidal steady-state analysis; impedance, transfer functions.

*Effective March 1, 1969.

312. *Analysis of Linear Systems*

Winter, Spring. 4(4-0) 311.

Topological constraint equations; linear graph theory and its application to modeling electrical, mechanical, hydraulic and other systems; state models for general systems; numerical and analytical solutions.

313. *Analysis of Large Scale Systems*

Spring, Summer. 4(4-0) 312.

Solution of state models by functions of a matrix, stability, pulse and frequency response characteristics, analysis by Laplace and Z transforms, subassemblies of multi-terminal components.

322. *Properties of Semiconductors*

Winter, Spring. 4(4-0) PHY 288.

Elementary principles of wave mechanics and statistical mechanics and their use in developing the basic properties of semiconductors. Study of dielectric and magnetic properties of materials.

323. *Solid State Devices*

Spring, Summer. 4(4-0) 322, 311 or approval of department.

Formation and properties of a p-n junction. Fabrication and characteristics of transitors; terminal and thermal properties; biasing circuits.

345. *Instrumentation and Computation Laboratory*

Fall, Winter, Spring. 4(2-6) PHY 288.

Signal measuring and generating devices; accuracy and error considerations in laboratory measurements; terminal characteristics of components from measurements; use of analog computers.

347. *Electrical Properties Laboratory*

Spring, Summer. 3(1-6) 322, 345.

Investigation of dielectric and magnetic properties, contact voltage, Hall effect, energy gap and drift mobility. Transistor fabrication, evaluation, and biasing.

403. *Special Problems*

Fall, Winter, Spring, Summer. 1 to 4 credits. Approval of department.

Investigation of a topic in electrical circuits or systems compatible with the student's prerequisites, interest, and ability.

415. *Control Systems*

Fall. 3(3-0) 313 or M E 325; MTH 334.

Formulation of automatic control problems; review of modeling method; specifications, controllability and stability; controller design via root locus and state-vector methods; survey of digital control.

416. *Control System Design*

Winter. 4(3-3) 415.

Realization of linear controllers; consistent models for plant and computer sampling; algorithms for digital control; organization of digital controllers; simulation of control systems.

417. *Static Optimization*

Spring. 3(3-0) MTH 214, 334.

Mathematical formulation of engineering steady-state optimization problems; linear and quadratic performance functions; gradient methods, direct search, simulation, and introduction to dynamic optimization.

418. *Introduction to Network Synthesis*

Spring. 3(3-0) 313.

Overview: specification, approximation, synthesis. Physical realizability of passive two-element kind one-port and two-port functions. Foster and Cauer one-port syntheses. Lattice, ladder and cascade two-port syntheses. Selected active network synthesis.

425. *Small-Signal Electronics*

Fall. 3(3-0) 323.

Determination of small-signal parameters and their interrelationship. Small-signal amplifier voltage, current, and power amplification. Stability, noise, and transient effects.

426. *Large-Signal Electronics*

Winter. 4(3-3) 425.

Design and analysis of simple Class A, B, and C power amplifiers and of complementary and quasi-complementary amplifiers. Servo and operational amplifiers. Experiments on single and multistage signal and power amplifiers.

427. *Computer Electronics*

Spring. 4(3-3) 426.

Design, analysis, construction and evaluation of monostable, astable, and bistable multivibrator circuits and of linear sweep and logic circuits. Integrated circuits. Aspects of reliability.

435. *Guided Transmission Systems*

Fall. 3(3-0) 306.

Guided wave theory; classification of modes; mode impedance, propagation constant, wave velocities; traveling and standing waves; transmission lines; normal models in cylindrical waveguides; waveguide components; EM resonators.

436. *Microwave Networks and Antennas*

Winter. 4(3-3) 435.

Circuit theory for wave guiding systems; equivalent voltages and currents; impedance descriptions; scattering matrix; excitation and coupling; radiating systems; linear antennas; arrays; impedance; radiation fields; microwave antennas.

437. *Field-Charged-Particle Interactions*

Spring. 4(3-3) 436.

Dynamics of charged particles in static fields; microwave generation; space-charge-waves; klystron; traveling wave tubes; gas discharges; plasmas; plasma parameters; sheath formation; EM waves in plasmas; five laboratory exercises.

455. *Communications Systems*

Fall. 3(3-0) 313.

Study of systems for transmitting information at high frequencies over long distances. Relation between system parameers, such as bandwidth and signal-to-noise ratio, to performance of AM, FM, and digital communication systems.

456. *Information Transmission*

Winter. 3(3-0) 455.

Application of probability theory to the theoretical study of information transmission. Entropy and channel capacity as a basis for comparing modulation schemes.

457. *Communication Theory*

Spring. 4(3-3) 456.

Analysis of systems processing noise-like signals, including models for communication channels. Introduction to optimum detectors for pulse communication systems.

460. Introduction to Electromagnetics

Spring. 3(3-0) PHY 288.

Electric and magnetic fields; boundary conditions; Maxwell's equations. Electromagnetic waves. Wave guides and cavities. Charged particles in an electromagnetic field.

801. Special Problems

Fall, Winter, Spring, Summer. 1 to 4 credits. Approval of department.

Investigation of a topic in electrical engineering compatible with the student's prerequisites, interest, and ability.

811. Noise and Fluctuation Phenomena

Spring of even-numbered years; Summer of odd-numbered years. 3(3-0) Approval of department.

Nyquist formulation of thermal noise; noise phenomena associated with electron tubes, transistors, beam and parametric devices, amplifiers, mixers, and detectors; techniques and equipment for noise measurements.

816. Quantum Electronics

(988.) Fall. 3(3-0) Approval of department.

Quantized wave motion; Hamiltonian function and operator; hydrogen atom and energy states; transition probabilities; spontaneous and induced transitions; statistical physics; transport phenomena; band theory applied to conductors, semi-conductors and insulators.

818. Electrical Properties of Materials I

Winter of odd-numbered years. 3(3-0) 816.

Study of atomic and molecular properties affecting the conductivity, permittivity, permeability, absorptivity and radioactivity of materials, classical and quantum considerations.

819. Electrical Properties of Materials II

Spring of odd-numbered years. 3(3-0) 818.

Temperature and frequency effects on conduction, dielectric constant, and dielectric loss; temperature, frequency and bias effects on the behavior of ferrite materials; stimulated emission and absorption in materials.

831. Foundations of Network Synthesis

Fall. 3(3-0) Approval of department.

One-port networks; RL, RC, LC and RLC networks; driving point immitances; positive real properties; realization procedures.

832. Filter Synthesis I

Winter. 3(3-0) 831.

Two-port LC networks; transmission characteristics; filter design techniques based on image parameters; Cauer filters.

833. Filter Synthesis II

Spring. 3(3-0) 832.

Scattering parameters; Butterworth, Chebyshev and elliptic filters, phase equalizers synthesis based on insertion functions.

835. Electromagnetic Theory I

(804.) Fall. 3(3-0) Approval of department.

Physical concepts and mathematical solution of Maxwell equations; boundary conditions; force and energy equations; potential equations; Green's function; wave equations; radiation and propagation of electromagnetic waves.

836. Electromagnetic Theory II

Winter. 3(3-0) 835.

Formulation of electric-circuit theory from viewpoint of electromagnetic theory; caluclation of impedance; propagation of electromagnetic wave in isotropic and anisotropic media; skin effects; boundary value problems.

837. Guided Transmission Systems

(812.) Spring. 3(3-0) 835.

Electromagnetic fields in open-wire lines, coaxial lines and wave guides; power and energy relationships; orthogonality properties; normal modes; resonant cavities; modes of propagation in stratified media; microwave circuits.

845. Mathematical Models for Random Phenomena

Fall, Summer. 3(3-0) Approval of department.

Generation of mathematical models that employ probabilistic notions to describe control, communication, and related systems, with emphasis on distributions of random variables, conditioning, and properties of random sequences.

846. Analysis of Random Time Functions

Fall, Winter. 3(3-0) 845.

Mathematical models for time-dependent random phenomena; properties of correlation functions and spectral densities; stationarity and ergodicity; response of linear systems to random inputs; introduction to applied harmonic analysis.

847. Communication Systems

Winter, Spring. 3(3-0) 846.

Comparative analysis of modulation systems; optimal relation between bandwidth and signal-to-noise ratio; telemetry and radar systems.

848. Physical Electronics

Fall. 3(3-0) Approval of department.

Types of electron emission; electron motion in electromagnetic fields; beam focusing; longitudinal and transverse beam waves; concepts of interaction between electrons and fields; basic principle of parametric electronics.

849. Microwave Electronics

(813.) Winter. 3(3-0) 835, 848.

Principles of microwave generators, including klystrons, magnetrons, traveling-wave tubes and particle accelerators; non-linear electron-wave interactions; crossed-field devices; solid state microwave electronics.

850. Ionized Gases

Spring. 3(3-0) 835 or PHY 448. Interdepartmental with the Astronomy Department.

Elastic collision processes; Boltzmann equation; moment equations; basic plasma phenomena; motion of a charged particle in electrical and magnetic field; individual and collective charged particle behavior.

852. Semiconductor Devices

Winter. 3(3-0) 816.

Applications of the diffusion and continuity equations to semiconductor devices; delineation of the device terminal properties including transient operation.

853. Semiconductor Applications

Spring. 3(3-0) 852.

Equivalent circuits; analysis of circuit operation including high frequency effects, noise properties, nonlinear effects.

899. Research

(EGR 899.) Fall, Winter, Spring, Summer. Variable credit. Approval of department.

911. General Automata Theory I

(E E 981.) Fall. 3(3-0) SYS 827 or approval of department. Interdepartmental with and administered by the Computer Science Deparmtent.

Characterization of machines and programs as finite automata; structure and decomposition of finite automata.

912. General Automata Theory II

(E E 982.) Winter. 3(3-0) CPS 911. Interdepartmental with and administered by the Computer Science Department.

Linear bounded automata; turing machines; recursive sets; degree of difficulty of computations.

913. General Automata Theory III

(E E 983.) Spring. 3(3-0) CPS 912. Interdepartmental with and administered by the Computer Science Department.

Reliability and redundancy of finite automata; threshold logic nets; pattern recognition automata; command and control automata.

926. Antenna Theory I

Winter of even-numbered years. 3(3-0) 837.

Linear antennas; cylindrical dipole antennas as radiating, receiving and scattering elements; current and charge distributions on antennas; electromagnetic fields of antennas; coupled antennas, linear antenna arrays.

927. Antenna Theory II

Spring of even-numbered years. 3(3-0) 926.

Microwave antennas; slot antennas; slot wave guide arrays; horn and reflector-type antennas; frequency independent antennas; pattern theory.

928. Microwave Laboratory

Summer of even-numbered years. 3(2-3) 837, 927, 989.

Experiments on transmission line systems; scattering measurements; antenna measurements; interaction of electromagnetic waves with plasmas; radiation in plasmas; experiments on electron tubes and on lasers.

931. Network Synthesis I

Fall of even-numbered years. 3(3-0) 825.

Further properties of linear graphs and network matrices; synthesis of resistive networks; analytical and computer solution.

932. Network Synthesis II

Winter of odd-numbered years. 3(3-0) 831, 931.

Synthesis of multi-port RLC networks; topological synthesis procedures.

933. Network Synthesis III

Spring of odd-numbered years. 3(3-0) 932.

Selected topics in network synthesis; contemporary developments in multi-port network synthesis.

945. Mean Square Filtering and Prediction

Fall of even-numbered years. 3(3-0) 845.

Stationary and ergodic ensembles of signals; correlation functions; Wiener's solution to optimum filtering and prediction problems.

946. Extraction of Signals from Noise

Winter of odd-numbered years. 3(3-0) 945.

Auto-correlation and cross-correlation in detecting signals in noise; application of decision theory to the detection problem; measurement of message characteristics in noise.

947. *Space Communications*

Spring of odd-numbered years. 3(3-0) 847, 946.

Communication theory and switching theory applied to the study of communications in space; rate of information and error probability in pulse modulation systems for long distance communications.

955. *Microelectronics I*

Fall of odd-numbered years. 3(3-0) 853.

Basic physical principles underlying the operation, design, and fabrication of microelectronic devices.

956. *Microelectronics II*

Winter of even-numbered years. 3(3-0) 955.

Miniaturized components; thin-film networks; solid-state circuits and operational limitations.

957. *Semiconductor Switching Circuits*

Spring of even-numbered years. 3(2-3) 956 or approval of department.

Switching design considerations; theory and application of device characteristics in switching circuits. Laboratory experiments using transistors and microcircuits.

975. *Quantum Electromagnetics*

Winter of odd-numbered years. 3(3-0) 816.

Tensors; four-vector formulation of classical electromagnetics; relativistic electromagnetics; Lagrangian ond Hamiltonian—classical and relativistic; Schrodinger's equation—classical and relativistic; quantization of wave fields, hydrogen atoms.

976. *Lasers and Masers*

Spring of odd-numbered years. 3(3-0) 975.

Coherence, emission, absorption and amplification of radiation; energy levels for optically active materials; threshold, band width, excitation modes and other operating characteristics; applications and recent developments.

989. *Waves and Radiations in Plasmas*

Fall of even-numbered years. 3(3-0) 850. Interdepartmental with the Astronomy Department.

Plasma oscillation; interaction, electromagnetic fields with plasmas, wave propagation in magnetionic media; plasma sheath; radiation of electric source in incompressive and compressive plasmas; electroacoustic waves; magnetohydrodynamics; research topics in plasmas.

990. *Electromagnetic Wave Propagation I*

Winter of odd-numbered years. 3(3-0) 835.

Electromagnetic plane waves, collimated beams and pulses, phase velocity, group and signal velocity, velocity of energy transport, propagation of plane waves in homogeneous dispersive media, reflection of spherical wave from homogeneous boundaries, propagation in wave guides with complex boundaries.

991. *Electromagnetic Wave Propagation II*

Spring of odd-numbered years. 3(3-0) 990.

Propagation in monotonically stratified media, propagation in turbulent media (scattering), propagation in stratified media, propagation in quasi-periodic media, Brillouin scattering, pulses in inhomogeneous media, propagation in moving media, complex Doppler effect, coupling between Maxwell equations and continuum equations, depolarization of EM waves.

999. *Research*

(EGR 999.) Fall, Winter, Spring, Summer. Variable credit. Approval of department.

Systems Science SYS

465. *Process Optimization Methods*

Spring. 3(3-0) MTH 215, knowledge of linear algebra. Interdepartmental with and administered by the Chemical Engineering Department.

Methods for determining optimum design and operating policies of systems of varying complexity. Includes classical methods, mathematical programming and modern methods.

475. *Introduction to Operations Research*

Winter. 4(4-0) MTH 215, CPS 120. Interdepartmental with and administered by the Agricultural Engineering Department.

Methodology and basics of operations research; formulation and analysis of probabilistic models of inventory, waiting line, and reliability processes; random process simulation and network planning models.

801. *Special Problems*

Fall, Winter, Spring, Summer. 1 to 4 credits. May re-enroll for a maximum of 8 credits. Approval of department.

811. *System Methodology and Simulation*

Fall. 3(2-3) MTH 215; STT 441 or concurrently. Interdepartmental with the Computer Science Department and Social Science (College of).

First of three courses providing a working knowledge of the design and control of multi-process systems by simulation. Needs analysis, feasibility analysis, preliminary design using simulation models, microscopic simulations—Monte Carlo, analog, digital and hybrid simulation of macroscopic systems, simulation languages, applicasions to physical socioeconomic systems.

812. *System Identification*

Winter. 3(2-3) 811. Interdepartmental with the Computer Science Department and Social Science (College of).

Identification of system structure from operating data; correlation function, frequency response, multi-point boundary value, econometric and other methods, applications to physical and socioeconomic systems.

813. *System Project*

Spring. 3(1-6) 812. Interdepartmental with the Computer Science Department and Social Science (College of).

Team application of simulation methods to the design and/or control of multi-process system. Projects will be taken from case studies or new problem areas where appropriate.

825. *Foundations of Systems Science*

Fall, Summer. 4(4-0) MTH 215 and 334.

Basic definitions; set theory, graph theory, matrices and vector differential and difference equations in system theory; solutions in terms of functions of matrices and operational calculus.

826. *Linear Concepts in Systems Science*

Fall, Winter. 4(4-0) 825.

State-space and frequency domain models of interconnected systems; solution of continuous and discrete-time linear systems; response characteristics; stability.

827. *Nonlinear Concepts in Systems Science*

Winter, Spring. 4(4-0) 826.

Existance, uniqueness and stability; autonomus systems and the phase space; linearization, perturbation, describing functions and harmonic balance procedures; numerical solutions.

828. *Introduction to Static and Dynamic Optimization and Control*

Summer. 3(3-0) MTH 215, 334, or approval of department.

Problem formulation and classification; cost functionals; application of Lagrange multipliers, gradient methods, mathematical programing, direct search and other optimization techniques; necessary conditions for optimal control of constrained dynamic systems.

847. *Analysis of Stochastic Systems*

Spring. 3(3-0) E E 846.

Equilbrium properties of non-stationary random processes; problems or estimation, filtering and prediction; sequential and recursive decision schemes; applications of random process theory to system modeling.

888. *Hybrid Computation*

Spring. 3(3-0) Approval of department.

Hybrid programing techniques, applications in simulation design, control and optimization.

899. *Research*

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

961. *Optimal Control Theory I*

Fall. 3(3-0) 827, 828 or approval of department; MTH 426.

Formulation of the general control problem; controlability, observability and normality in discrete-state and continuous-state systems; performance functionals; typical control problems.

962. *Optimal Control Theory II*

Winter. 3(3-0) 961.

Optiman control theory in continuous-state and discrete-state systems; necessary and sufficient conditions for optimal solutions, geometric interpretations relation to calculus of variations; typical applications.

963. *Optimal Control Theory III*

Spring. 3(3-0) 962 or approval of department.

Topics selected among: computational methods for optimal controls (solution of selected two-point boundary value problems); stochastic control theory; state estimation, Kalman filtering and related statistical methods; differential game theory.

999. *Research*

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

ENGINEERING EGR

College of Engineering

160. *Engineering Communications*

Fall, Winter, Spring. 4(1-6) MTH 108 or 111 or concurrently.

Engineering graphics, a means used by engineers to communicate their ideas to others. Freehand sketching, descriptive geometry, and graphical, numerical and computer problem solutions.

161. *Mechanical Drawing*

Fall, Winter, Spring. 2(0-4)

Lettering and use and care of instruments. Orthographic projection, working drawings, machine sketching and isometric drawing.

162. *Mechanical Drawing*

Fall, Winter, Spring. 2(0-4) 160 or 161.

Continuation of 161 with emphasis on freehand lettering and sketching, advanced working drawings.

260. *Machine Drawing*

Fall, Spring. 3(0-6)

Advanced orthographic projection, detail, and assembly drawing, sections and conventions, tracings, illustration and other pictorial drawings of mechanical elements.

263. *Structural Drawing*

Winter. 3(0-6) 160.

Structural steel, reinforced concrete, masonry, and timber detail drawings. Highway drawings and mapmaking.

267. *Architectural Drafting I*

Fall, Winter, Spring. 3(0-6)

House construction detailing. Analysis and drawing of typical standard details.

268. *Descriptive Geometry*

Fall. 3(2-2) 160, 161.

Problems involving relations of points, lines, and planes. Intersections, developments, coplanar, and noncoplanar vectors.

270. *Computer Graphics*

Spring. 3(3-0) CPS 110 or 120 or LBC 125; EGR 160 or 161; or approval of department.

Use of computer controlled display systems for the solution of multidimensional problems.

364. *Architectural Drafting II*

Winter. 3(0-6) 267.

Functional and standard procedure in the layout of floor plans in traditional and modern houses. Rendered plot plan and required details.

365. *House Planning*

Fall, Winter, Spring. 3(1-4)

Elementary house architecture. Drawing plans from sketches. Kitchen planning, house styles, elements of design, financing, heating, lighting.

366. *Architectural Perspective Drawing*

Fall. 3(0-6) Any engineering graphics course.

One-point and two-point perspective, revolved plan and measuring line methods. Pencil rendering, problems in shade and shadows. House model to scale, optional.

463. *Architectural Drafting III*

Spring. 3(0-6) 364 or 365.

Traditional and modern elevations. One- and two-point rendered perspective. Functional plans drawn in 364 or 365 required.

ENGLISH ENG

College of Arts and Letters

091. *English for Foreign Students—Elementary*

Fall, Winter, Spring, Summer. Zero credit. [3(5-0) to 15(25-0)]†. English language proficiency examination.

Grammer, conversation, composition, pronunciation and laboratory in the English language for foreign students on the elementary level.

092. *English for Foreign Students—Intermediate*

Fall, Winter, Spring, Summer. Zero credit. [3(5-0) to 15(25-0)]†. English language proficiency examination.

Grammar, conversation, composition, pronunciation and laboratory in the English language for foreign students on the intermediate level.

093. *English for Foreign Students—Advanced*

Fall, Winter, Spring, Summer. Zero credit. [3(5-0) to 15(25-0)]†. English language proficiency examination.

Grammar, conversation, composition, pronunciation and laboratory in the English language for foreign students on the advanced level.

094. *English for Foreign Students—Supplementary*

Fall, Winter, Spring, Summer. Zero credit. [3(5-0) to 6(10-0)]†. English language proficiency examination.

Composition and pronunciation in the English language for foreign students in need of supplementary work only.

101. *Freshman Composition I*

Fall, Winter, Spring. 4(3-1)

Practice in writing expository prose.

102. *Freshman Composition II*

Fall, Winter, Spring. 5(3-2)

Continuation of 101.

200H. *Honors Work*

Fall, Winter, Spring. 1 to 16 credits. Approval of department.

201. *Nature of Language*

Fall, Winter, Spring, Summer. 3(3-0) ATL 113.

Various aspects of language—phonology and orthography; morphology, semantics and the lexicon; syntax; and dialects—with special reference to American English.

205. *Introduction to Shakespeare*

Fall, Winter, Spring. 3(3-0) ATL 113.

A study of selected plays illustrating the powers of England's greatest writer.

206. *Forms of Literature*

Fall, Winter, Spring, Summer. 3(3-0) Required of majors and minors. Open to Freshmen.

Major forms of prose fiction, designed to reveal artistic problems met and solved by these forms. Prepares students for advanced literary study by acquainting them with the conventions of various literary forms, by providing a critical vocabulary and by furnishing experience in reading and writing critical evaluations of outstanding literary works from all historical periods.

†See page A-2 item 3

207. *Forms of Literature*

Fall, Winter, Spring, Summer. 3(3-0) Required of majors and minors. Open to Freshmen.

Major forms of drama, designed to reveal artistic problems met and solved by these forms.

208. *Forms of Literature*

Fall, Winter, Spring, Summer. 3(3-0) Required of majors and minors. Open to Freshmen.

Major forms of poetry, designed to reveal artistic problems met and solved by these forms.

213. *Expository Writing*

Fall, Winter, Spring, Summer. 3(3-0) ATL 113.

Practice in informative writing to develop mastery of a clear, accurate style and of practical, basic expository forms.

214. *Composition for Secondary English Teachers*

Fall, Winter Spring. 4(3-1) ATL 113.

Writing practice in various modes such as personal narrative and description, the familiar essay, drama, poetry, and fiction. Exercises in creative dramatics. Discussion of the process of composing and the teaching of oral and written composition in junior and senior high schools.

228A. *Fiction Writing*

Fall, Winter, Spring, Summer. 4(4-0) 206 and written approval of department.

The writing of short fiction. Classes and individual conferences. Approval to enroll requires a conference with the instructor and will usually be on the basis of manuscripts submitted to him.

228B. *Fiction Writing*

Fall, Winter, Spring, Summer. 4(4-0) Written approval of department.

The writing of fiction. Classes and individual conferences. Approval to enroll requires a conference with the instructor and will usually be on the basis of manuscripts submitted to him.

229. *Poetry Writing*

Fall, Winter, Spring. 4(4-0) 208 and written approval of department.

The writng of poetry. Classes and individual conferences. Approval to enroll requires a conference with the instructor and will usually be on the basis of manuscripts submitted to him.

300A. *Advanced Fiction Writing*

(300.) Fall, Winter, Spring, Summer. 4(4-0) May re-enroll in 300A and/or 300B for a maximum of 15 credits. 228B and written approval of the department.

Advanced work in the writing of fiction. Classes and individual conferenoes. Approval to enroll requires a conference with the instructor and will usually be on the basis of manuscripts submitted to him.

300B. *Advanced Poetry Writing*

(300.) Fall, Winter, Spring, Summer. 4(4-0) May re-enroll in 300A and/or 300B for a maximum of 15 credits. 229 and written approval of department.

Advanced work in the writing of poetry. Classes and individual conferences. Approval to enroll requires a conference with the instructor and will usually be on the basis of manuscripts submitted to him.

301. *Literature and the Adolescent*

Fall, Winter, Spring. 4(3-1) 208.

Extensive reading of literature appropriate for secondary school students. Discussion of formal literature programs in relation to student's reading needs. Methods of analyzing literature and establishing common and individualized reading programs.