

**BUSINESS LAW AND OFFICE  
ADMINISTRATION\* BOA**

**College of Business**

**201. Shorthand I**  
Fall, Winter, Spring, Summer. 3(4-0)  
234 or 1 term typewriting.

Gregg shorthand theory, dictation and transcription for students with no previous training.

**202. Shorthand II**  
Fall, Winter, Spring, Summer. 3(3-1)  
201, 234 or 1 term shorthand and typewriting.  
Development of theory and transcription competency, speed building.

**234. Typewriting I**  
Fall, Winter, Spring, Summer. 2(2-2)  
Approval of department.  
Mastery of keyboard; building speed and accuracy; elementary typewriting problems.

**235. Typewriting II**  
Fall, Winter, Spring. 2(2-2) 234 or approval of department.  
Improvement of speed and accuracy; arrangement of business letters, tabulation and manuscripts; production typewriting.

**236. Advanced Typewriting**  
Fall, Winter, Spring, Summer. 3(3-1)  
235 or 1½ to 2 years typewriting.  
Instruction in specialized typewriting problems to develop high-level competency.

**304. Advanced Shorthand**  
Fall, Winter, Spring. 3(3-1) May re-enroll for a maximum of 6 credits. 202, 235.  
Continuation of 202.

**308. Secretarial Administration I**  
Winter, Spring. 4(4-0) 236, 304.  
Sophomores.  
Development of proficiency in transcription skills.

**309. Secretarial Administration II**  
Fall, Winter, Spring. 4(4-2) 236,  
Sophomores.  
Machine dictation-transcription; duplication and copying processes; machine calculations; records management.

**341. Survey of Business Law**  
Fall, Winter, Spring. 4(4-0) Juniors.  
Not open to business administration students.  
Historical development of the law; courts, court procedures and civil remedies, torts, crimes; contracts, agency, sales, negotiable instruments, real and personal property, including bailments and liens. Textbook and lecture rather than case approach.

**370. Administrative Office Management**  
Fall, Winter, Spring, Summer. 3(3-0)  
Juniors.  
Analysis of office function and relationship to business organization; information handling and data processing; office design and layout; responsibilities of office administrators.

\*Name change effective December 15, 1976. Formerly Business Law, Insurance and Office Administration.

**855. Effects of Ionizing Radiations on Plants**

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

Nature of ionizing radiations related to their effects upon plant growth and development including aspects of radiation sensitivity, dosimetry, direct and indirect effects, genetic, evolution and environmental implications related to modes of action at the cell, organism, and population levels.

**863. Advanced Environmental Physiology**

Winter. 3(3-0) 413 or approval of department.

The plant in relation to its environment: energy exchange; coupling between CO<sub>2</sub> assimilation and transpiration; hydraulics in the stationary and nonstationary states; transport of ions, carbohydrates, and hormones; stress physiology.

**865. Advanced Growth and Development**

Fall. 3(3-0) 415 or approval of department.

Advanced treatment of the physiological processes of growth and development. The mechanism underlying these processes and the roles played by hormones, light, etc., in controlling them will be analysed.

**871. Biology of Nematodes**

Spring. 4(2-6) 470 or approval of department. Interdepartmental with and administered by the Department of Entomology.

Ontogeny, taxonomy, morphology, pathology and ecology of nematodes, with special reference to plant-parasitic and phyto-pathogenic species.

**878. Comparative Limnology**

Summer. 6 credits. Approval of department. Given at W. K. Kellogg Biological Station. Interdepartmental with and administered by the Department of Zoology.

Theoretical concepts and methods of analysis of environmental parameters influencing productivity of freshwaters. Comparative field investigations of lakes, streams, and other aquatic habitats.

**880. Plant Virology**

Fall of odd-numbered years. 5(2-6)  
405 or approval of department.

External and internal symptomatology, transmission, interactions, purifications, assay and serology of plant viruses.

**881. Pathogenesis and Disease Resistance**

Winter of odd-numbered years. 4(3-2)  
405 and 415, or approval of department.

Lectures, readings, and discussions on mechanisms of pathogenicity and infectivity; physiology and biochemistry of disease development; tumorigenesis; metabolic consequences of infection; nature of disease resistance; and parasitism.

**883. Plant Disease Control**

Fall of even-numbered years. 3(2-2)  
405.

Principals and methods in controlling plant diseases. Considerable emphasis is placed on the chemistry of fungicides, and their role in controlling plant diseases. Other factors affecting disease epidemiology are covered.

**885. Plant Diseases in the Field**

Spring. 4 credits. 405 and approval of department.

Diagnosis, distribution and sequential developments of plant diseases in the field.

**890. Selected Topics in Plant Pathology**

Fall, Winter, Spring. 2 to 5 credits.  
Approval of department.

Topics will be selected from the following areas: parasitism, plant viruses, ecology, genetics, nematology, fungicidal action, and soil microbiology.

**899. Research**

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

Research for thesis at the master's degree level in one of the following fields: anatomy, cytology, ecology, genetics, lichenology, morphology, mycology, pathology, phycology, physiology, and taxonomy.

**918. Advanced Genetics**

Winter of odd-numbered years. 3(3-0)  
Approval of department.

Role of the gene in differentiation and development, with special emphasis upon the genetic mechanisms responsible for the control of phenogenesis.

**920. Advanced Plant Taxonomy**

Spring of even-numbered years. 4(4-0)  
824, ZOL 441.

Consideration of the recent scientific developments affecting plant classification.

**930. Advanced Plant Ecology**

Winter of odd-numbered years; Summer of even-numbered years. Given at W. K. Kellogg Biological Station summer term. 3(2-4)  
Approval of department.

Fundamental theories and modern research horizons.

**952. Plant Physiology and Biochemistry I**

Winter of odd-numbered years. 3(3-0)  
Approval of department. Interdepartmental with and administered by the Department of Biochemistry.

Selected topics concerning photosynthesis and related processes.

**955. Plant Physiology and Biochemistry II**

Winter of even-numbered years. 3(3-0)  
Approval of department. Interdepartmental with and administered by the Department of Biochemistry.

Metabolic pathways of unique significance to plants.

**956. Advanced Plant Physiology IV**

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

Factors influencing vegetative and reproductive physiology.

**999. Research**

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

Research for dissertation at the doctor's degree level in one of the following fields: anatomy, cytology, ecology, genetics, lichenology, morphology, mycology, paleobotany, pathology, phycology, physiology, and taxonomy.

**BUILDING CONSTRUCTION**

See Agricultural Engineering

**Descriptions — Business Law and Office Administration  
of  
Courses**

**400H. Honors Work**

Fall, Winter, Spring, Summer. 1 to 15 credits. Approval of department.

Independent and informal study in law, office administration or business communications.

**416. Secretarial Administration III: Seminar**

Winter, Spring. 4(4-0) Seniors or approval of department.

Analysis of the role of the executive secretary.

**440. Law and Society**

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

Legal reasoning and legal institutions. Court systems and court procedures. Relationships of citizen and businessman to governmental agencies. Torts, crimes.

**441. Contracts and Sales**

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

440.

Contracts, including concept of freedom of contract and limitations. Sales. Case study method.

**442. Agency, Partnerships and Corporations**

Winter. 3(3-0) 441.

The law dealing with agency and business organizations. Case study method.

**443. Negotiable Instruments, Secured Transactions, Property**

Spring. 3(3-0) 441.

The law of negotiable instruments, secured transactions, and property. Case study method.

**445. Real Estate Law**

Winter. 3(3-0) 341 or 441.

Law of the real estate business. Combined text and case approach.

**446. Interstate and International Business Law**

Spring. 3(3-0) 440.

Laws of contracts, sales, negotiable instruments, agency, business associations in the interstate and international spheres. Maritime contracts. International commercial arbitration. Area-directed studies.

**447. Hotel Law**

Winter, Spring. 4(4-0) 440.

Legal aspects of the hospitality industry.

**468. Field Studies**

Fall, Winter, Spring, Summer. Variable credit. May re-enroll for a maximum of 8 credits. Approval of department.

Planned program of observation and work in selected business firms. Analysis and reports.

**848. The Legal Environment of Business**

Fall, Summer. 4(4-0)

Critical examination of the environment in which business operates. Analysis of the component elements of the legal environment of business and the structural framework in which law functions.

**849. Legal Environment of International Business**

Spring, Summer. 4(4-0)

Commercial and financial transactions in international business, foreign agencies, branches, subsidiaries. Aspects of labor relations, anti-trust, taxation, and transportation as related to foreign operations. Litigation and arbitration in the international business community.

**871. Seminar: Office Administration**

Winter, Summer. 3 credits. May re-enroll for a maximum of 6 credits. Approval of department.

Problems, practices, and policies involved in office administration. Methods of establishing, analyzing, standardizing, and controlling administrative systems and procedures in the office.

**878A. Seminar in Business Law**

(878) Winter. 4(4-0) 848 or approval of department.

Contracts, sales, secured transactions and consumer legislation viewed from the judicial, legislative and executive vantage points.

**878B. Seminar in Business Law**

Spring. 4(4-0) 848 or approval of department.

Agency, partnerships and corporations, viewed from legislative, judicial and executive vantage points, as they affect entrepreneurial decision making.

**890. Special Problems**

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

**307. Transfer Processes and Separations III**

Spring. 4(3-2) 306.

Mass transfer in continuous contacting systems and stagewise processes. Counter-current processes, fractionation, contacting, efficiency, and simultaneous momentum, heat, and mass transfer.

**311. Thermodynamics for Chemical Engineering**

(202.) Spring. 3(3-0) CEM 361.

First and second laws. Energy, enthalpy, entropy, free energy, the mathematics of property relationships. Energy conversion processes. Thermodynamics of flow.

**381. Chemical Engineering Analysis**

Fall, Spring. 3(3-0) Students may not receive credit in both 381 and MTH 341. MTH 215. Interdepartmental with the Department of Mathematics.

Formulation of ordinary and partial differential equations describing chemical systems. Boundary value problems, numerical methods, matrices, and applications, to chemical engineering systems.

**411. Phase and Chemical Equilibria**

Fall. 3(3-0) 311.

Properties in solutions. Deviations from ideality. Liquid-vapor equilibria. Chemical equilibria in the gas, liquid, and solid states. Electrochemical and irreversible systems.

**423. Chemical Engineering Laboratory**

(422.) Spring. 3(1-6) 307 or concurrently.

Assigned laboratory problems, requiring team effort. Experimental work, involving momentum, heat and mass transfer; separation processes, such as distillation, filtration, and drying; reactor kinetics; automatic process control.

**424. Transport Phenomena and Physical Properties Laboratory**

Fall. 3(1-6) 307.

Experiments involving the transport processes and measurement of physical, chemical and thermodynamic properties of various materials. Comparison of theoretical and experimental results.

**428. Chemical Reaction Engineering**

Fall. 3(3-0) CEM 361 or approval of department.

Quantitative treatment of mechanisms and rates of chemical reactions. Catalysis. Design and analysis of flow and non-flow reactors. Interpretation of laboratory kinetic data.

**442. Polymer Science and Engineering**

Winter. 3(3-0) One year organic chemistry, CEM 361.

Structure of polymers. Polymerization reaction kinetics. Polymer characterization. Solution rheology. Polymer processing and fabrication. Commercial polymerization processes.

**443. Chemical Engineering of the Solid State**

Spring. 3(3-0) CEM 361.

Structure and properties of inorganic and organic solids. Relation of bond type and steric configuration to mechanical, electrical, thermal, optical properties. Macroscopic structure influence on physical properties. Surface phenomena. Applications.

**CHEMICAL  
ENGINEERING**

**CHE**

**College of Engineering**

**222. Pollution of the Environment—  
Causes and Cures**

Spring. 3(3-0) Nonmajors; no science or technical background required.

Pollution of air, water and land. Adulteration of foods. Overtaxing waste facilities. Depleting natural resources. Interaction of engineers, industry, government, and the public in creating and combating these problems.

**300. Material and Energy Balances**

(201.) Fall. 4(3-2) One year general chemistry, MTH 214 or concurrently, CPS 120 or concurrently.

Chemical engineering calculations. Synthesis of chemical process systems. Analysis of chemical process systems by material and energy balances. Behavior of gases. Enthalpy calculations for changes of temperature, phase changes, chemical reactions.

**305. Transfer Processes and Separations I**

Fall. 4(3-2) MTH 215; CHE 300 or concurrently.

Thermodynamics of fluid flow. Treatment of fluid flow as a momentum transfer process. Laminar and turbulent motion of compressible and incompressible fluids. Heat transfer in solids and flowing fluids.

**306. Transfer Processes and Separations II**

Winter. 4(3-2) 305.

Heat transfer in condensing and boiling systems. Multiple effect evaporation. Radiant heat transfer. Application to engineering equipment. Mass transfer in single-phase systems, transport analogies interphase transfer and contacting of immiscible phases.