

860. Graduate Reading Course
Fall, Winter, Spring. 1 to 5 credits.
May reenroll for a maximum of 15 credits. Approval of department.
Supervised reading course for investigation of special fields in Russian literature.

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

981. Seminar in Slavic Studies
Fall, Winter, Spring. 3(3-0) May reenroll for a maximum of 18 credits.
A particular writer, a major work, or a limited theme is chosen for intensive analysis.

999. Doctoral Dissertation Research
Fall, Winter, Spring, Summer. Variable credits. May reenroll for a maximum of 36 credits.

LYMAN BRIGGS SCHOOL

LBS

College of Natural Science

Lyman Briggs School has a six term sequence in Chemistry and Physics that may be completed to fulfill the School's requirements in Chemistry and Physics. This sequence involves Lyman Briggs School 161 through 163L and Lyman Briggs School 261 through 263L. It is a coordinated sequence that is comparable to certain courses in the Department of Chemistry and the Department of Physics. Any student who plans to complete only part of the sequence must contact the faculty coordinator of either the Chemistry or the Physics portion.

111. College Algebra
Fall. 5(5-0) Placement Test or approval of school. Not open to students with credit in MTH 108, MTH 109, or MTH 111.

Rational and real numbers, functions, inverse functions, polynomials, rational functions, exponential and logarithmic functions, trigonometric functions and their inverses.

112. Calculus I
Fall, Winter, Spring. 5(5-0) LBS 111 or MTH 109; LBS 124 concurrently. Not open to students with credit in MTH 112.

Theory and applications of derivatives to polynomials, rational functions, trigonometric functions and their inverses, logarithmic and exponential functions. Definition and properties of the definite integral. Numerical approximations of definite integrals.

113. Calculus II
Fall, Winter, Spring. 5(5-0) LBS 112 and LBS 124. Not open to students with credit in MTH 113.

Further applications of the derivative to related rates, approximations including Newton's method and graphing. The mean value theorem. Integration techniques, applications, and improper integrals. The conics and polar coordinates.

124. APL-Computer Programming for Scientists
Fall, Winter, Spring. 3(3-0) LBS 112 or concurrently. Interdepartmental with the Department of Computer Science.

APL programming; interactive programming techniques; arithmetic, logical, and extended APL operators; functions; applications to concurrent topics in mathematics; principles of operations of time-shared computers.

131. Science and Technology Studies: Writing I
Fall, Winter, Spring. 4(4-0)

Instruction and practice in expository writing. Paper and report topics on science, technology and human values in Western civilization.

132. Third Culture Rhetoric II
Winter, Spring. 4(4-0) LBS 131.

Continuation of LBS 131 with emphasis upon investigative papers. Selected students may meet course requirements through independent study.

For prerequisite purposes the introductory biology sequence LBS 140, 141, 242 may be used in place of Biological Science 210, 211, 212.

140. Biology I
Winter, Spring. 4(3-3) Not open to students with credit in BS 212.

The organisms and their environment. Organismal level of organization. Evolution and adaptation as forces for biological variance.

141. Biology II
Fall, Spring. 4(3-3) LBS 140; not open to students with credit in BS 210.

Cellular structure and function. Maintenance and manipulation of materials, energy, space and information at the cellular and tissue level of organization.

142. Biology IA
Winter, Spring. 1 to 2 credits. May reenroll for a maximum of 4 credits. LBS 140 or concurrently.

Selected problems such as analysis of biological data, interspecific and intraspecific competition, microarthropods inhabiting leaf litter, spring flora, diversity, stability and evolution of natural communities.

160. Physics-Elementary Concepts
Winter. 1(2-0) LBS 162 or concurrently.
Elementary concepts of mechanics, electricity, magnetism and optics.

161. Introduction to Chemistry and Physics I
Fall. 3(4-0) MTH 108 or MTH 109 or MTH 111 or LBS 111 concurrently; LBS 161L or concurrently or approval of instructor.

Gases and gas laws, kinetic theory, heat and thermodynamics. Equilibria, solutions, acids and bases, ionization and electrolysis.

161L. Introductory Chemistry Laboratory
Fall. 1(0-3) LBS 161 or concurrently or approval of instructor.

Techniques and instruments in the chemistry laboratory. Includes qualitative, quantitative and synthetic work.

162. Introduction to Chemistry and Physics II
Winter. 3(4-0) LBS 161; LBS 162L or concurrently or approval of instructor.

Basic concepts of atomic and nuclear structure, wave particle duality, the quantum theory and the special theory of relativity. Radioactivity, nuclear reactions and elementary particle physics.

162L. Introductory Physics Laboratory
Winter. 1(0-3) LBS 162 or concurrently or approval of instructor.

Introduction to techniques and instruments in the physics laboratory. Selected experiments in classical and modern physics.

163. Introduction to Chemistry and Physics III
Spring. 3(4-0) LBS 162; LBS 163L or concurrently or approval of instructor.

Periodic properties and chemical families, stoichiometry, modern theory of chemical bonding, molecular orbitals. Chemical dynamics and equilibria, some organic chemistry nomenclature and reaction kinetics.

163L. Introductory Chemistry Laboratory
Spring. 1(0-3) LBS 163 or concurrently or approval of instructor.
Continuation of LBS 161.

216. Calculus III
Fall, Winter, Spring. 5(5-0) LBS 113.

Series, sequences, power series including Taylor series, and indeterminate forms. Graphing and vector geometry in 3-spaces. Differential calculus of functions of several variables through Taylor series and extreme points.

217. Calculus IV
Fall, Winter, Spring. 5(5-0) LBS 216.
Credit may not be earned in both LBS 217 and MTH 310.

Double and triple integrals and their applications. Line integrals. Ordinary differential equations of first order and linear second order equations, including series solutions. Numerical methods for single and Simultaneous equations.

233. Special Topics in Third Culture Rhetoric
Fall, Winter, Spring. 1 to 2 credits.
May reenroll for a maximum of 6 credits. LBS 132.

Guided study of relations between the humanities and sciences. Students submit written work.

For prerequisite purposes the introductory biology sequence LBS 140, 142, 242 may be used in place of Biological Science 210, 211, 212.

242. Biology III
Fall, Winter. 4(3-3) LBS 141. Not open to students with credit in BS 211.

Organismal growth and development from molecular genetics through life cycles of selected plant and animal species.

of
Courses

256. Energy Consumption and Environmental Quality (N)
Spring. 3(3-0) Interdepartmental with and administered by Physics.

The role of energy as a fundamental pollutant will be discussed along with the availability of fossil energy sources. Limitations on the safe utilization of both fossil and nuclear energy will also be considered.

261. Introduction to Chemistry and Physics IV

Fall. 3(4-0) LBS 163; LBS 261L or concurrently or approval of instructor; LBS 112 or MTH 112 recommended.

Kinematics and dynamics of classical particle and rigid body motion. Fundamentals of atomic, molecular vibration-rotation and nuclear magnetic resonance spectroscopy.

261L. Introductory Physics Laboratory

Fall. 1(0-3) LBS 261 or concurrently or approval of instructor.

Continuation of LBS 162L.

262. Introduction to Chemistry and Physics V

Winter. 3(4-0) LBS 261; LBS 262L or concurrently or approval of instructor.

Chemistry of non-metals, transitional elements and coordination compounds, some organic chemistry. The major emphasis is on descriptive chemistry using principles developed in LBS 161, LBS 162, and LBS 163.

262L. Introductory Chemistry Laboratory

Winter. 1(0-3) LBS 262 or concurrently or approval of instructor.

Continuation of LBS 163L.

263. Introduction to Chemistry and Physics VI

Spring. 3(4-0) LBS 261; LBS 263L or concurrently or approval of instructor.

Classical theory of electricity and magnetism. Electromagnetic wave motion and wave optics. Selected topics in solid state physics, and the special and general theories of relativity.

263L. Introductory Physics Laboratory

Spring. 1(0-3) LBS 263 or concurrently or approval of instructor.

Continuation of LBS 261L.

290. Directed Study

Fall, Winter, Spring. 1 to 6 credits. May reenroll for a maximum of 6 credits. Approval of school.

Faculty directed studies in curricular areas which are normally related to regular course offerings.

A. Directed Study—General

1 or 2 credits.

B. Directed Study—Biology

1 or 2 credits.

C. Directed Study—Chemistry/Physics

1 or 2 credits.

F. Directed Study—Computer Science

1 to 3 credits.

295. Independent Study

Fall, Winter, Spring. 1 to 4 credits. May reenroll for a maximum of 12 credits. Approval of school.

Student conceived individual courses of study in curricular areas. Preliminary faculty approval and continuing guidance.

A. Independent Study—General

B. Independent Study—Biology

C. Independent Study—Chemistry/Physics

D. Independent Study—Mathematics

E. Independent Study—Science and Technology Studies

331. Modern Fiction

Fall. 4(4-0) LBS 132 or LBS 131 with a 3.0 or better.

Recent fiction and its cultural backgrounds, particularly those of special value to students of science. Students may submit original fiction in partial fulfillment of course writing requirements.

332. Modern Drama

Winter. 4(4-0) LBS 132 or LBS 131 with 3.0 or better.

Recent plays which have social and literary significance. Students may submit original dramatic writings as partial fulfillment of course writing requirements.

333. Modern Poetry

Spring. 4(4-0) LBS 132 or LBS 131 with 3.0 or better.

Recent poetry of literary and social nature. Students may submit original poetry in partial fulfillment of course writing requirements.

344. Introductory Animal Systematics Laboratory

Fall. 2(1-3) ZOL 303 concurrently. Interdepartmental with the Department of Zoology.

Laboratory examination of form and function of representative vertebrate and invertebrate animal.

361. Philosophy of Technology

Fall, Winter. 4(4-0) Sophomores or approval of school. Interdepartmental with the Department of Philosophy.

Is our technology desirable? Are its social forms desirable? What alternatives are there? Students will develop and defend their own appraisals of technology.

373. Introduction to the Philosophy of Science

Winter, Spring. 4(4-0) Juniors or approval of school.

Philosophical problems about the character and justification of scientific knowledge. Possible topics: concept formation, theory construction, scientific explanation, confirmation theory, 'logic' of discovery, philosophical implications of physical theories.

374. Historical Problems in the Biological Sciences

Fall, Winter. 4(4-0) Juniors or approval of school.

Various themes or periods in the biological sciences. The course may emphasize the pattern of theoretical development, changes in explanatory ideals, the interaction of external factors and scientific ideas, etc.

375. Historical Problems in the Physical Sciences

Spring. 4(4-0) Juniors or approval of college.

Various themes or periods in the physical sciences. The course may emphasize the pattern of theoretical development, changes in explanatory ideals, the interaction of external factors and scientific ideas, etc.

376. Historical Problems in Technical Change

Fall, Spring. 4(4-0) Juniors or approval of school.

Factors which influence technical change. Exploration of both historical and contemporary problems of technology and technical change.

377. The Natural Environment: Perceptions and Practices

Spring. 4(4-0) Sophomores.

Factors which have influenced U.S. environmental attitudes as reflected in art and literature. Ways in which changing attitudes have led to changes in legislation and practice.

378. Popular Culture and Technical Change

Winter. 4(4-0) Juniors or approval of school. Interdepartmental with American Studies.

Interrelationships among elements of mass culture and technical change. Introduction to relevant research methods.

484. Philosophy of Biological Sciences

Winter, Spring. 4(4-0) Nine credits in science or approval of school. Interdepartmental with the Department of Philosophy.

Methodological notions and problems of the biological sciences such as: observation and measurement, classification, teleological and functional explanation, teleological systems, emergentism, vitalism, value neutrality.

490. Directed Study

Fall, Winter, Spring. 1 to 6 credits. May reenroll for a maximum of 12 credits. Juniors and approval of school.

Faculty directed studies in curricular areas which are normally related to regular course offerings.

A. Directed Study—General

B. Directed Study—Biology

C. Directed Study—Chemistry/Physics

D. Directed Study—Mathematics

E. Directed Study—Science and Technology Studies

491. Senior Seminar I

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

Selected problems in the study of science and technology as human activities, using philosophical, historical, literary, social science or interdisciplinary perspectives or methods. Thesis topic refined and outlined.

492. Senior Seminar II

Fall, Winter, Spring. 4(4-0) LBS 491 or written approval of instructor.

Research, write, defend and evaluate a significant thesis paper in science and technology studies or related interdisciplinary science problems.

493. Field Experience

Fall, Winter, Spring. 1 to 15 credits. May reenroll for a maximum of 16 credits. Approval of school.

Experiential learning related to the public or private practice of science and technology.

- 495. Independent Study**
Fall, Winter, Spring. 1 to 12 credits. May reenroll for a maximum of 12 credits. Juniors and approval of school.
 Student conceived individual courses of study in curricular areas. Preliminary faculty approval and continuing guidance.
- A. Independent Study—General
 - B. Independent Study—Biology
 - C. Independent Study—Chemistry/Physics
 - D. Independent Study—Mathematics
 - E. Independent Study—Science and Technology Studies

MANAGEMENT MGT

College of Business

- 101. Introduction to Business**
Fall, Winter, Spring. 4(4-0) University College students or approval of department.
 Functions performed by business and the role of administration in our economy as a whole and in the operation of a specific business. Four major objectives: to aid students in choosing a vocation, to help business majors select a field of concentration, to show the place of specialized techniques presented in more advanced business courses, and to give some familiarity with common business practices and terminology.
- 302. Organization and Management**
Fall, Winter, Spring, Summer. 4(4-0) Junior Business majors; EC 201, AFA 201.
 Executive roles and functions in the business enterprise and other goal directed institutions; organization design; organization/environment interaction; analysis of internal organization structure; leadership, motivation, conflict, organization change and development.
- 303. Materials and Logistics Management**
(300.) Fall, Winter, Spring, Summer. 4(4-0) Juniors in the College of Business or approval of department. Interdepartmental with the Department of Marketing and Transportation Administration.
 Management concepts and techniques for purchasing, operations and distribution processes. Productivity and profit contributions. Planning, analysis and control of purchasing, production and transportation-distribution.
- 304. Operations Planning and Control**
(301.) Winter, Spring. 4(4-0) MGT 303 or approval of department. Interdepartmental with the Department of Marketing and Transportation Administration.
 Managing the production system. Product development, process selection, facilities location and layout; staffing; materials, cost and quality control.
- 305. Purchasing Management**
Fall, Winter, Spring. 4(4-0) MGT 303 or approval of department. Interdepartmental with the Department of Marketing and Transportation Administration.
 Planning, organizing and controlling the purchasing function within organizations. Purchasing responsibilities, objectives and policies. Source selection and evaluation. Price, cost and value analysis. Negotiation. Managing purchase inventories.

- 306. Analysis of Processes and Systems**
Fall, Winter, Spring. 4(4-0) CPS 110, MTA 317 or concurrently.
 Analysis of some fundamental systems and process concepts which are basic to industrial management. The course is oriented toward computer model building, acquainting the student with the use of the computer as an instrument for analysis of complex problems in industry. Course includes consideration of criteria for efficiency and optimization, and program planning.
- 310. Fundamentals of Personnel Management**
Fall, Winter, Spring, Summer. 4(4-0) Juniors.
 Formulation and administration of employee relations policies in the business enterprise; human resource utilization; introduction to personnel staffing, training and development, performance appraisal, compensation, and labor relations.
- 341. Transportation Distribution Systems**
Fall, Winter, Summer. 4(4-0) MGT 303 or approval of department. Interdepartmental with and administered by the Department of Marketing and Transportation Administration.
 Application of economic and business principles to transportation and distribution systems, functional analysis of all major transport modes. Identification of major issues, analysis of alternatives and discussion of probable future outcomes.
- 342. Traffic Management**
Winter, Spring, Summer. 4(4-0) MGT 303 or approval of department. Interdepartmental with and administered by the Department of Marketing and Transportation Administration.
 Basic practices related to purchasing and operating transportation services for private and public enterprises.
- 403. Research and Negotiation for Purchasing Materials and Management**
Winter. 4(4-0) MGT 303 or approval of department. Interdepartmental with the Department of Marketing and Transportation Administration.
 Applied research and planning focusing on the purchasing and materials management functions in organizations. Preparation for and conducting purchase negotiations. Field research studies. Administration of the research and planning effort.
- 405. Operations Management Topics**
Spring. 4(4-0) MGT 303 or approval of department. Interdepartmental with the Department of Marketing and Transportation Administration.
 Consideration of current and controversial questions in operations management. Field experience to study operations and policies in business. Industry studies; impact of new technology and government regulations.
- 406. Introduction to Management Science**
Winter. 4(4-0) MGT 306.
 Quantitative models and techniques applied to various business problems integrating the computer into the problem solving process. Topics include linear programming, integer programming, dynamic programming, queuing problems, Bayesian Decision Theory, theory of games.

- 407. Materials and Logistics Policy**
Winter, Spring. 4(4-0) MGT 303 plus 12 credits in MLM Program. Interdepartmental with and administered by the Department of Marketing and Transportation Administration.
 Analysis of comprehensive cases incorporating topical coverage of the entire materials and logistics management program.
- 409. Business Policy**
Fall, Winter, Spring, Summer. 4(4-0) Seniors in business administration and MGT 302; AFA 391; MTA 300.
 Problems, methods, and analytical frameworks for building and maintaining consistent and effective policy frameworks in the business enterprise. Written and oral analyses are made of comprehensive cases cutting across the major functions within business organizations. Team and individual reports are required.
- 411. Staffing the Organization**
Fall. 4(4-0) MGT 310; MTA 317.
 Job design; job analysis; manpower planning; recruitment, selection, and placement; employment interviewing and testing; validation of selection procedures; affirmative action constraints; EEOC guidelines; induction and orientation of employees.
- 412. Appraisal, Compensation and Benefits**
Winter. 4(4-0) MGT 310.
 Wage and salary administration; job evaluation; employee motivation; performance appraisal; relating pay to performance; financial and non-financial incentives; equity considerations; employee benefits.
- 413. Occupational Safety and Health Administration**
Fall, Winter. 4(4-0) Juniors; MGT 302 for majors.
 Programs and procedures for control of work accidents and maintenance of health in business and other organizations. Analysis of costs related to employee and product safety. Administration of a safety program in compliance with new Federal law.
- 415. Managerial Approaches to Collective Bargaining**
Winter, Spring. 4(4-0) MGT 302 or Junior non-business majors.
 Union-management problems and managerial strategy and tactics in collective bargaining—the union challenge, legal constraints, negotiations and operating under the contract, dimensions of cooperation and conflict.
- 417. Minorities and Women in the World of Work**
Fall, Spring. 4(4-0) Senior majors or approval of department. Interdepartmental with the School of Social Work.
 Racial, ethnic, sexual and other minority experiences and problems in the world of work. Awareness training approach (what it's like to be ...) featuring movies, guests, subgroup discussions and encounter-type exercises.
- 419. Group Dynamics and Organization Development**
Spring. 4(4-0) MGT 302. Students may not receive credit in both MGT 419 and PSY 356.
 Group dynamics and development; organizational diagnosis; assessment of work attitude and organization climate; organization development goals and methods; action research, survey feedback, team building, conflict management; evaluating organization development activities.