

**899. Master's Thesis Research**  
Fall, Winter, Spring, Summer. Variable credit. Approval of instructor.

**999. Doctoral Dissertation Research**  
Fall, Winter, Spring. Variable credit. Approval of instructor.

**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. Third Culture Rhetoric I**  
Fall, Winter. 4(4-0)

Instruction and practice in expository writing. Paper and report topics drawn from readings which relate science and human values.

**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 B S 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 B S 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.

**143. Biology IIA**  
Fall, Spring. 2 credits. May reenroll for a maximum of 4 credits if different topic is taken. LBS 141 or concurrently.

Selected biology problems considering such topics as genetics, bacterial culturing and staining techniques, photosynthesis and histological techniques.

**160. Physics-Elementary Concepts**  
(150.) 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 B S 211.

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

**256. Energy Consumption and Environmental Quality (N)**  
Spring. 3(3-0) Interdepartmental with and administered by the Department of 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.

## Descriptions – Lyman Briggs School

of

## Courses

- 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 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.
- 372. Introduction to Symbolic Logic**  
Fall, Winter. 4(4-0) Sophomores or approval of school.  
Concepts, notation and application of truth-functional and quantificational logic. Special topics may include axiomatics, meta-theory, modal logic, fallacies, paradoxes, inductive argument, the justification of logic.
- 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 school.  
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.
- 483. Philosophy of Physical Science**  
Fall. 4(4-0) Nine credits in physical science or approval of school. Interdepartmental with the Department of Philosophy.  
Philosophical problems of the physical sciences. The topics will be taken from such areas as: quantum mechanics, space-time, classical mechanics, relativity.
- 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 Studies
- 491. Senior Seminar I**  
Fall, Winter, Spring. 3(3-0) Seniors or approval of school.  
Selected interdisciplinary problems concerned with the interface between science and society or science and man are identified and formulated. A bibliography is generated and an outline for a thesis prepared.
- 492. Senior Seminar II**  
Fall, Winter, Spring. 3(3-0) LBS 491.  
The thesis planned in LBS 491 is written and evaluated.
- 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.

