

LYMAN BRIGGS**LB****Lyman Briggs College****105C Preparatory - Physics**

Summer. 1(1-0) Interdepartmental with Physics. Administered by Lyman Briggs. RB: College Algebra

Preparation for the introductory physics sequence: mathematical concepts, notations, representations, effective problem solving techniques and study strategies.

118 Calculus I

Fall, Spring. 4(4-0) P: (MTH 114 or MTH 116) or designated score on Mathematics Placement test RB: College Algebra and Trigonometry R: Open to students in the Lyman Briggs College. SA: LBS 118 Not open to students with credit in MTH 152H or MTH 132 or MTH 153H.

Limits, continuity, differentiation, integration, and elementary applications.

119 Calculus II

Fall, Spring. 4(4-0) P: LB 118 or MTH 132 R: Open to students in the Lyman Briggs College. SA: LBS 119 Not open to students with credit in MTH 133 or MTH 153H.

Continuation of LB 118. Integration techniques, elementary differential equations, parametric curves, polar coordinates, sequences and series, vectors, and vector operations.

133 Introduction to History, Philosophy, and Sociology of Science

Fall, Spring. 4(4-0) P: Designated score on English Placement test R: Open to students in the Lyman Briggs College or in the Science, Technology, Environment and Public Policy Specialization. SA: LBS 133 Not open to students with credit in AL 192 or AL 192H or RCAH 112 or WRA 110 or WRA 115 or WRA 120 or WRA 125 or WRA 130 or WRA 135 or WRA 140 or WRA 145 or WRA 150 or WRA 195H.

Introduction to the history, philosophy, and sociology of science, technology, the environment, and medicine. Instruction and practice in formal writing.

144 Biology I: Organismal Biology

Fall, Spring. 4(3-3) R: Open to students in the Lyman Briggs College. SA: LBS 144 Not open to students with credit in BS 110.

Modern biology at the organismal level of integration. Principles of genetics, evolution, ecology, and organismal diversity as interactive units.

145 Biology II: Cellular and Molecular Biology

Fall, Spring. 5(3-4) P: {LB 144 or (BS 162 and BS 172) or (BS 182H and BS 192H)} and (LB 171 or CEM 141 or CEM 181H or CEM 151) R: Open to students in the Lyman Briggs College. SA: LBS 145 Not open to students with credit in BS 161 or BS 171 or BS 181H or BS 191H.

Modern biology, mainly at the cellular level of integration. Principles of cell structure and function used to explain processes of bioenergetics, protein synthesis, and development.

155 Introduction to Quantitative Science and Research

Fall. 3(2-3) P: (MTH 1825 or concurrently) or (MTH 103 or concurrently) R: Open to freshmen in the Lyman Briggs College.

Exploration of fundamental chemistry, biology, physics, mathematics and statistics. Quantitative analysis and research.

171 Principles of Chemistry I

Fall. 4(4-0) P: MTH 114 or (MTH 116 or concurrently) or (MTH 132 or concurrently) or (MTH 133 or concurrently) or (MTH 152H or concurrently) or (LB 118 or concurrently) or (LB 119 or concurrently) R: Open to students in the Lyman Briggs College. SA: LBS 165, LBS 171 Not open to students with credit in CEM 141 or CEM 151 or CEM 181H. C: LB 171L concurrently.

Stoichiometry, quantum mechanics and interactions of light with matter, periodic trends, Lewis dot structures, molecular structure, polarity and intermolecular forces, valence bond theory, introduction to organic chemistry, enthalpy and heat transfer.

171L Introductory Chemistry Laboratory I

Fall. 1(0-3) R: Open to students in the Lyman Briggs College. SA: LBS 165L, LBS 171L Not open to students with credit in CEM 161 or CEM 185H. C: LB 171 concurrently.

Determination of density and molecular weight. Stoichiometry. Acid-base titration, redox titration. Reaction kinetics, thermochemistry, Beer's law, freezing point depression, and equilibrium constants.

172 Principles of Chemistry II

Spring. 3(4-0) P: LB 171 or CEM 141 or CEM 151 or CEM 181H R: Open to students in the Lyman Briggs College. SA: LBS 266, LBS 172 Not open to students with credit in CEM 142 or CEM 152 or CEM 182H. C: LB 172L concurrently.

Gases, properties of solutions, introduction to solid state chemistry, molecular orbital theory, chemical equilibria, chemical kinetics, acid/base equilibria, solubility equilibria, entropy, free energy, electrochemistry, redox reactions, nuclear chemistry.

172L Principles of Chemistry II - Reactivity Laboratory

Spring. 1(0-3) P: (LB 171 or CEM 141 or CEM 152 or CEM 182H) and (LB 171L or CEM 161 or CEM 185H) R: Open to students in the Lyman Briggs College. SA: LBS 266L, LBS 172L Not open to students with credit in CEM 162 or CEM 186H. C: LB 172 concurrently.

Synthesis and characterization of chemical systems.

181 Introduction to Science, Technology, the Environment and Public Policy

Fall. 3(3-0) Interdepartmental with Fisheries and Wildlife and James Madison College. Administered by Fisheries and Wildlife.

Relation of science and technology to ethics and public policy. Environmental law and public policy. Managing fish, water and wildlife resources at state, national, and international levels. Science and technology in developing countries. Impacts of military technology on environmental policy.

181H Honors Cell and Molecular Biology

Spring. 3(3-0) Interdepartmental with Biochemistry and Molecular Biology and Biological Science and Microbiology and Molecular Genetics. Administered by Biological Science. P: (CEM 141 or concurrently) or (CEM 151 or concurrently) or (CEM 181H or concurrently) or (LB 171 or concurrently) SA: BS 149H, BS 111 Not open to students with credit in BS 161 or LB 145.

Physicochemical and molecular organization of cells as the unifying framework for genetics, evolution, and the social relevance of biology.

182H Honors Organismal and Population Biology

Fall. 3(3-0) Interdepartmental with Biological Science and Plant Biology and Zoology. Administered by Biological Science. P: BS 181H SA: BS 148H, BS 110 Not open to students with credit in BS 162 or LB 144.

Diversity and basic properties of organisms, with emphasis on genetic principles, ecological interactions, and the evolutionary process. Historical approach to knowledge discovery.

191H Honors Cell and Molecular Biology Laboratory

Spring. 2(1-3) Interdepartmental with Biochemistry and Molecular Biology and Biological Science and Microbiology and Molecular Genetics. Administered by Biological Science. P: BS 181H or concurrently SA: BS 159H, BS 111L Not open to students with credit in BS 171 or LB 145.

Basic techniques of cellular and molecular biology including experimental design and hypothesis formulation; biochemistry, molecular biology and genetics.

192H Honors Organismal and Population Biology Laboratory

Fall. 2(1-3) Interdepartmental with Biological Science and Plant Biology and Zoology. Administered by Biological Science. P: BS 182H or concurrently SA: BS 158H, BS 110 Not open to students with credit in BS 172 or LB 144.

Nature and process of organismal biology, including experimental design and statistical methods, hypothesis testing, genetics, ecology, and evolution.

220 Calculus III

Fall, Spring. 4(4-0) P: LB 119 or MTH 133 or MTH 153H R: Open to students in the Lyman Briggs College. SA: LBS 220 Not open to students with credit in MTH 234 or MTH 254H.

Continuation of LB 119. Differential calculus of functions of two or three variables. Double and triple integrals. Line and surface integrals.

270 Medical Terminology

Summer. 2(2-0) RB: (PSL 250 or PSL 310 or PSL 431) and junior or senior status.

Medical terminology, focusing on human systems, anatomy and physiology, fundamental word building principles, and phonetic pronunciations.

Lyman Briggs—LB

- 273 Physics I**
Fall. 4(3-3) P: LB 118 or MTH 132 or MTH 152H R: Open to students in the Lyman Briggs College. SA: LBS 271, LBS 271L, LBS 164 Not open to students with credit in PHY 183 or PHY 231 or PHY 193h or PHY 191 or PHY 251.
Basic physics principles and problem solving techniques. Mechanical systems (Newton's laws, momentum and energy conservation, rotational motion, gravity), elementary thermodynamics, oscillations and waves, and atomic nuclei. Laboratory techniques, instrumentation, and selected experiments in classical and modern physics.
- 274 Physics II**
Spring. 4(3-3) P: LB 273 RB: LB 119 or MTH 133 or MTH 153H R: Open to students in the Lyman Briggs College. SA: LBS 267, LBS 272, LBS 272L Not open to students with credit in PHY 184 or PHY 232 or PHY 294h or PHY 192 or PHY 252.
Basic physics principles and problem solving techniques. Principles of electromagnetic theory, circuits, special relativity, quantum physics, optics, atomic and subatomic physics. Laboratory error analysis and selected experiments in classical and modern physics.
- 290A Directed Study-Multidisciplinary**
Fall, Spring. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Open to students in the Lyman Briggs College. SA: LBS 290A
Directed studies involving at least two Lyman Briggs College curricular areas: biology, chemistry, physics, mathematics, history, philosophy, and sociology of science.
- 290B Directed Study-Biology**
Fall, Spring. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Open to students in the Lyman Briggs College. SA: LBS 290B
Directed studies in biology.
- 290C Directed Study-Chemistry/Physics**
Fall, Spring. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Open to students in the Lyman Briggs College. SA: LBS 290C
Directed studies in chemistry and physics.
- 290D Directed Study-Mathematics**
Fall, Spring. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Open to students in the Lyman Briggs College. SA: LBS 290D
Directed studies in mathematics.
- 290E Directed Study-History, Philosophy, and Sociology of Science**
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Open to students in the Lyman Briggs College. SA: LBS 290E
Directed study in history, philosophy, and sociology of science.
- 290F Directed Study-Computing**
Fall, Spring. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Open to students in the Lyman Briggs College. SA: LBS 290F
Directed studies in computing.
- 330 Topics in History, Philosophy, and Sociology of Science (W)**
Fall, Spring, Summer of odd years. 4(4-0) P: (LB 133) or completion of Tier I writing requirement R: Open to students in the Lyman Briggs College or in the Science, Technology, Environment and Public Policy Specialization. SA: LBS 330
Topics in history, philosophy, and sociology of science, technology, the environment, and medicine.
- 331 Literature and Science (W)**
Fall, Spring. 4(4-0) P: (LB 133) or completion of Tier I writing requirement R: Open to students in the Lyman Briggs College. SA: LBS 331
Representations of science, technology, the environment, and medicine in texts drawn from science fiction, Gothic, and utopian literature, or mainstream writings.
- 332 Technology and Culture (W)**
Fall, Spring. 4(4-0) Interdepartmental with American Studies. Administered by Lyman Briggs. P: (LB 133) or completion of Tier I writing requirement R: Open to students in the Lyman Briggs College or in the American Studies major or in the Science, Technology, Environment and Public Policy Specialization. SA: LBS 332
History of technology with special emphasis on the interaction of technical innovation and other elements of culture.
- 333 Topics in History of Science (W)**
Fall, Spring. 4(4-0) P: (LB 133) or completion of Tier I writing requirement R: Open to students in the Lyman Briggs College or in the Science, Technology, Environment and Public Policy Specialization. SA: LBS 333
Various themes or periods in physical/biological science. May emphasize patterns of theory development, changes in explanatory aims and standards or interaction of social and cultural factors with scientific ideas, practices, instrumentation or experimentalism.
- 334 Science, Technology, and Public Policy (W)**
Fall of odd years, Spring. 4(4-0) P: (LB 133) or completion of Tier I writing requirement R: Open to students in the Lyman Briggs College or in the Science, Technology, Environment and Public Policy Specialization. SA: LBS 334
Formation, implementation, and evaluation of public policy related to science, technology, the environment, and medicine.
- 335 The Natural Environment: Perceptions and Practices (W)**
Fall of even years, Spring. 4(4-0) Interdepartmental with American Studies. Administered by Lyman Briggs. P: (LB 133) or completion of Tier I writing requirement R: Open to students in the Lyman Briggs College or in the American Studies major or in the Science, Technology, Environment and Public Policy Specialization. SA: LBS 335
American attitudes toward the natural environment and related public and private institutions.
- 336 Gender, Sexuality, Science, Technology (W)**
Spring. 4(4-0) P: (LB 133) or completion of Tier I writing requirement R: Open to students in the Lyman Briggs College or in the Science, Technology, Environment and Public Policy Specialization. SA: LBS 336
Significance of gender in relation to science, technology, the environment, and medicine.
- 347 Advances in Applied Biology**
Fall. 3(1-4) P: (LB 145 or BS 161 and BS 171) or (BS 181H and BS 191H) and Completion of Tier I Writing Requirement R: Open to students in the Lyman Briggs College. SA: LBS 347
Advances in cell and molecular biology and application: plant and animal breeding, environment, and therapeutics.
- 355 Philosophy of Technology (W)**
Spring. 4(4-0) Interdepartmental with Philosophy. Administered by Lyman Briggs. P: (LB 133) or completion of Tier I writing requirement RB: PHL 200 R: Open to students in the Department of Philosophy or in the Lyman Briggs College or in the Science, Technology, Environment and Public Policy Specialization. SA: LBS 355
Examination of the desirability of technology, its social forms, and its alternatives. Conventional productivist, ecological progressive, and radical humanist outlooks.
- 368 Science, Technology and Society**
Fall. 3(3-0) Interdepartmental with Sociology. Administered by Sociology. RB: (LB 133) or some familiarity with basic concepts and methods in sociology. R: Not open to freshmen or sophomores. Approval of department.
Role of science and technology in social change. Values and ethics in contemporary perspectives, controversies, and cases. Science and technology as forms of knowledge.
- 380 International Studies in Lyman Briggs College**
Fall, Spring, Summer. 1 to 8 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Approval of college; application required.
International experiences. Contemporary and historical problems in science from local to international levels. Case studies and interactions with officials, community leaders and leading professionals.
- 415 Methods of Theoretical Physics**
Spring. 4(4-0) Interdepartmental with Physics. Administered by Lyman Briggs. P: ((MTH 234 or concurrently) or (LB 220 or concurrently) or (MTH 254H or concurrently)) and (LB 273 or PHY 183 or PHY 193H) and (LB 274 or PHY 184 or PHY 294H) RB: (MTH 235 or concurrently) or (MTH 255H or concurrently) or (MTH 340 or concurrently) SA: LBS 415
Mathematical methods applied to physical problems in mechanics, electromagnetism, and thermodynamics. Multiple integration, vector calculus, Fourier series, ordinary and partial differential equations, eigenvector problems, coordinate transformations, and complex analysis. Newtonian mechanics, rigid body dynamics, heat flow, electrostatics, harmonic motion, and waves.

- 416 History of the Atomic Bomb and Nuclear Culture**
Fall of odd years. 3(3-0) Interdepartmental with History. Administered by History. P: Completion of Tier I Writing Requirement R: Not open to freshmen or sophomores.
The atom bomb as a technical, military, political, scientific, and cultural object. Conception and harnessing of atomic energy, the changing role of science, and the introduction of global suicide as strategic policy. Focus on the network of resources necessary to produce a technical object such as the atom bomb, as well as the socio-cultural impact of the introduction of new technology.
- 425 American and European Health Care since 1800**
Spring. 4(4-0) Interdepartmental with History. Administered by History. P: Completion of Tier I writing requirement. R: Not open to freshmen.
Social and cultural transformation in health care delivery since 1800, primarily in North America and western Europe. Therapeutic revolutions. Medical education and professionalization. Social and alternative medicine. Managed care.
- 438 Philosophy of Ecology (W)**
Spring of even years. 3(3-0) Interdepartmental with Fisheries and Wildlife. Administered by Fisheries and Wildlife. P: Completion of Tier I Writing Requirement RB: Additional coursework in ecology, natural resources, philosophy, or environmental sciences. R: Open to juniors or seniors or graduate students.
Conceptual issues in the science of ecology, including connections between ecology and environmental philosophy. Western and non-western perspectives.
- 459 Science, Technology, Environment and Public Policy Capstone**
Fall, Spring. 3(3-0) Interdepartmental with James Madison College. Administered by James Madison College. P: (FW 181 or approval of college) and completion of Tier I writing requirement
Selected topics in science, technology, environment and public policy (STEPPS). Analysis of key issues and problems. Case studies.
- 473A Literature and Medicine**
Spring. 3(3-0) Interdepartmental with English. Administered by English. P: Completion of Tier I Writing Requirement R: Not open to freshmen or sophomores. SA: ENG 483
Human dimensions of medicine as seen in literature. Health, illness, mortality. Medical dilemmas. Physical and psychological self. Psychological theories used in interpreting literature. Cultural history of the body. Theories of embodiment.
- 490A Advanced Directed Study--Multidisciplinary**
Fall, Spring. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Open to students in the Lyman Briggs College. SA: LBS 490A
Directed advanced studies involving at least two Lyman Briggs College curricular areas: biology, chemistry, physics, mathematics, history, philosophy, sociology of science, and computing.
- 490B Advanced Directed Study--Biology**
Fall, Spring. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Open to students in the Lyman Briggs College. SA: LBS 490B
Directed advanced studies in biology.
- 490C Advanced Directed Study--Chemistry or Physics**
Fall, Spring. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Open to students in the Lyman Briggs College. SA: LBS 490C
Directed advanced studies in chemistry or physics.
- 490E Advanced Directed Study--History, Philosophy, Sociology of Science (W)**
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. P: (LB 133) or completion of Tier I writing requirement R: Open to students in the Lyman Briggs College or in the Science, Technology, Environment and Public Policy Specialization. SA: LBS 490E
Directed advanced studies in history, philosophy, sociology of science, technology, the environment, or medicine.
- 492 Senior Seminar (W)**
Fall, Spring. 4(4-0) P: Completion of Tier I Writing Requirement RB: One course in the History, Philosophy, and Sociology of Science at the 300-level or higher. R: Open to juniors or seniors in the Lyman Briggs College or in the Entomology major or in the Science, Technology, Environment and Public Policy Specialization. SA: LBS 492
Selected problems in the study of science and technology as human activities, using philosophical, historical, literary, social science or interdisciplinary perspectives or methods. Development and defense of thesis paper.
- 493 Field Experience**
Fall, Spring, Summer. 1 to 10 credits. A student may earn a maximum of 10 credits in all enrollments for this course. R: Open to students in the Lyman Briggs College. SA: LBS 493
Experiential learning related to the public or private practice of science and technology.
- 494 Undergraduate Research**
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Approval of college; application required. SA: LBS 494
Faculty-guided undergraduate research.