251 Intermediate Individualized Less Commonly Taught Language I
Fall. 4(4-1) A student may earn a maximum of 12 credits in all enrollments for this course. R: Approval of department.
Intermediate-level individualized work on speaking, reading and writing a less commonly taught language. Continued development of oral proficiency skills.

252 Intermediate Individualized Less Commonly Taught Languages II
Spring. 4(4-1) A student may earn a maximum of 12 credits in all enrollments for this course. R: Approval of department.
Further intermediate-level individualized work on speaking, reading and writing a less commonly taught language. Continued development of oral proficiency skills.

290 Independent Study
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Approval of department.
Special projects in Linguistics and Languages arranged by an individual student and a faculty member in areas supplementing regular course offerings.

352 Asian American Writing
Spring. 3(3-0) Interdepartmental with English. Administered by Department of English. P:M: Completion of Tier I writing requirement. RB: 3 credits of literature.
Writing by Americans of Asian descent. Attention to artistic, historical, and cultural contexts.

361 Asian Literature in English or in English Translation
Spring. 3(3-0) Interdepartmental with English. Administered by Department of English. P:M: Completion of Tier I writing requirement. RB: 3 credits of literature.
Literary traditions of a major Asian civilization--Chinese, Indian or Japanese. Historical, cultural, and international contexts of Asian literature.

380 Methods of Teaching Foreign Languages
Spring of odd years. 3(3-0) P:M: (GRM 202 or RUS 202 or CHS 202 or JPN 202) R: Open only to undergraduate students in the East Asian Languages and Cultures or German or Russian major with a teacher certification option or in the German or Japanese or Russian minor available for teacher certification.
Methods of teaching Germanic, Slavic, Asian, and African languages for teacher education candidates. Theories of second language acquisition and practical application of teaching strategies.

413 Slavic Language I
Fall. 4(4-1) A student may earn a maximum of 8 credits in all enrollments for this course. R: Approval of department. SA: RUS 413
Development of skills in speaking, reading, listening comprehension, and writing in a Slavic language other than Russian.

413A Polish I
Fall. 4(4-1) R: Approval of department. SA: RUS 413A
Development of skills in speaking, reading, listening comprehension, and writing in Polish.

414 Slavic Language II
Spring. 4(4-1) A student may earn a maximum of 8 credits in all enrollments for this course. P:M: (LL 413) R: Approval of department. SA: RUS 414
Further development of skills in speaking, reading, listening comprehension, and writing in a Slavic language other than Russian.

414A Polish II
Spring. 4(4-1) P:M: (LL 413A) R: Approval of department. SA: RUS 414A
Further development of skills in speaking, reading, listening comprehension, and writing in Polish.

474 Aesthetic Theory and Modernism
Fall. 4(4-0) Interdepartmental with Philosophy; English; History of Art; Music; Romance Languages. Administered by Department of Philosophy. R: Not open to freshmen or sophomores.
Problems, assumptions, and arguments of modern aesthetic theory examined in the context of debates over modernity and modernist artistic practice.

490 Independent Study
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Approval of department.
Special projects in linguistics and languages arranged by an individual student and a faculty member in areas supplementing regular course offerings.

LYMAN BRIGGS LBS SCHOOL

Lyman Briggs School
College of Natural Science

117 College Algebra and Trigonometry
Fall. 3(3-0) P:M: Designated score on Mathematics placement test. R: Open only to students in Lyman Briggs School. Not open to students with credit in MTH 103 or MTH 116.
Rational and real numbers. Functions and inverses. Equations, simultaneous equations. Inequalities. Graphing. Trigonometry.

118 Calculus I
Fall, Spring. 5(5-0) P:M: (LBS 117 or MTH 116 or MTH 114) or designated score on Mathematics placement test. R: Open only to students in Lyman Briggs School. Not open to students with credit in MTH 132 or MTH 133 or MTH 152H.
Limits, continuity, differentiation, integration, and elementary applications.

119 Calculus II
Fall, Spring. 4(4-0) P:M: (LBS 118) R: Open only to students in Lyman Briggs School. Not open to students with credit in MTH 133 or MTH 153H or MTH 235.
Continuation of LBS 118. Further applications of one variable calculus. Infinite series. Ordinary differential equations.

126 Personal Computers and Networks
Fall, Spring. 3(3-0) R: Open only to students in Lyman Briggs School. Not open to students with credit in CSE 101.
Selecting, installing and using personal computer software and hardware. Computer networks.

133 Introduction to Science and Technology Studies
Fall, Spring. 4(4-0) P:M: Designated score on English placement test. R: Open only to students in Lyman Briggs School. Not open to students with credit in AL 192 or AL 192H or ATL 110 or ATL 120 or ATL 125 or ATL 130 or ATL 135 or ATL 140 or ATL 145 or ATL 150 or ATL 195H or MC 111 or MC 112 or ATL 115.
Instruction and practice in expository writing. Paper and report topics drawn from readings in the history, philosophy, and other areas of science and technology.

144 Biology I: Organismal Biology
Fall, Spring. 4(3-3) R: Open only to students in Lyman Briggs School. 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:M: (LBS 144 or BS 110 or LBS 148H) and (CEM 141 or CEM 151 or concurrently or CEM 181H or concurrently or LBS 171 or concurrently) R: Open only to students in Lyman Briggs School. Not open to students with credit in BS 111.
Modern biology mainly at the cellular level of integration. Principles of cell structure and function are used to explain processes of bioenergetics, protein synthesis, and development.

148H Honors Organismal Biology
Fall. 3(3-0) Interdepartmental with Biological Science. R: Honors College student or approval of school. Not open to students with credit in BS 110 or LBS 144.
Diversity and basic properties of organisms, with emphasis on genetic principles, ecological interactions, and the evolutionary process. Historical approach to knowledge discovery.

149H Honors Cell and Molecular Biology
Spring. 3(3-0) Interdepartmental with Biological Science. P:M: (CEM 141 or concurrently or CEM 151 or concurrently or CEM 181H or concurrently or LBS 171 or concurrently) R: Honors College student or approval of school. Not open to students with credit in BS 111 or LBS 145.
Exploration of the physicochemical and molecular organization of cells as the unifying framework for genetics, evolution, and the social relevance of biology.

158H Honors Organismal Biology Laboratory
Fall. 2(1-3) Interdepartmental with Biological Science. Not open to students with credit in BS 110 or LBS 144. C: LBS 148H concurrently.
Basic procedures used by organismal biologists, including experimental design and statistical methods. Development and implementation of research projects to test hypotheses in genetics, ecology, and evolution.

159H Honors Cell and Molecular Biology Laboratory
Spring. 2(1-3) Interdepartmental with Biological Science. Not open to students with credit in BS 111L or LBS 145. C: LBS 149H concurrently.
Basic techniques of cellular and molecular biology including experimental design and hypothesis formulation. Student-initiated projects to test hypothesis-driven projects in biochemistry, molecular biology or genetics.

171 Principles of Chemistry I - Structure
Fall. 4(4-0) P:M: (LBS 117 or concurrently or MTH 116 or concurrently or MTH 132 or concurrently or MTH 133 or concurrently or MTH 152H or concurrently or LBS 118 or concurrently or LBS 119 or concurrently) R: Only open to students in Lyman Briggs School. SA: LBS 165 Not open to students with credit in CEM 141 or CEM 151 or CEM 181H. C: LBS 171L concurrently.
Chemical principles: structure and bonding, periodic properties. Stoichiometry, states of matter. Solutions, acids and bases, equilibria, thermodynamics, and kinetics.

171L Introductory Chemistry Laboratory I
Fall. 1(0-3) R: Open only to students in Lyman Briggs School. SA: LBS 165L Not open to students with credit in CEM 161 or CEM 185H. C: LBS 171 concurrently.
Determination of density and molecular weight. Stoichometry. Acid-base titration, redox titration. Reaction kinetics, thermochemistry, Beer's law, freezing point depression, and equilibrium constants.

172 Principles of Chemistry II - Reactivity
Spring. 3(4-0) P:M: (LBS 171 or CEM 141 or CEM 151 or CEM 181H) and (LBS 171L or CEM 161 or CEM 185H) R: Only open to students in Lyman Briggs School SA: LBS 266 Not open to students with credit in CEM 142 or CEM 152 or CEM 182H.
Spectroscopy, coordination chemistry, solubility and stability constants. Electrochemistry, main group chemistry, atmospheric chemistry, and organometallic chemistry. Polymers and biochemistry.

172L Principles of Chemistry II - Reactivity Laboratory
Spring. 1(0-3) P:M: (LBS 171 or CEM 141 or CEM 152 or CEM 182H) and (LBS 171L or CEM 161 or CEM 185H) and (LBS 172 or concurrently) R: Open only to students in Lyman Briggs School. SA: LBS 266L Not open to students with credit in CEM 162 or CEM 186H.
Synthesis and characterization of chemical systems.

220 Calculus III
Fall, Spring. 5(5-0) P:M: (LBS 119 or MTH 133) R: Open only to students in Lyman Briggs School. Not open to students with credit in MTH 234 or MTH 235 or MTH 254H or MTH 255H.
Continuation of LBS 119. Three-dimensional vector geometry, differential calculus of functions of two or three variables. Double and triple integrals, line integrals.

271 Physics I
Fall. 3(4-0) P:M: (MTH 132 or LBS 118 or MTH 152H) R: Open only to students in Lyman Briggs School. SA: LBS 164 Not open to students with credit in PHY 181B or PHY 183 or PHY 183B or PHY 193H or PHY 231 or PHY 231B or PHY 231C.
Basic physics principles, problem solving techniques.Mechanical systems, elementary thermodynamics, vibrations and waves. Atoms and nuclei.

271L Physics Laboratory I
Fall. 1(0-3) P:M: (LBS 271 or concurrently) R: Open only to students in Lyman Briggs School. SA: LBS 164L Not open to students with credit in PHY 191 or PHY 251.
Techniques and instruments in the physics laboratory.
Selected experiments in classical and modern physics.

272 Physics II
Spring. 3(4-0) P:M: (LBS 118 or MTH 133 or MTH 153H) and (LBS 271) R: Open only to students in Lyman Briggs School. SA: LBS 267 Not open to students with credit in PHY 182B or PHY 184 or PHY 184B or PHY 232 or PHY 232B or PHY 294H or PHY 232C.
Principles of electromagnetic theory, special relativity, quantum physics, optics, atomic and subatomic physics.

272L Physics Laboratory II
Spring. 1(0-3) P:M: (LBS 271L and LBS 272 or concurrently) R: Open only to students in Lyman Briggs School. SA: LBS 267L Not open to students with credit in PHY 192 or PHY 252.
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 only to Lyman Briggs School majors.
Directed studies involving at least two Lyman Briggs School curricular areas: biology, chemistry, physics, mathematics, science and technology, computer 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 only to students in Lyman Briggs School.
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 only to students in Lyman Briggs School.
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 only to students in Lyman Briggs School.
Directed studies in mathematics.

290E Directed Study--Science and Technology Studies
Fall, Spring. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Open only to students in Lyman Briggs School.
Directed study in science and technology studies.

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 only to students in Lyman Briggs School.
Directed studies in computing.

330 Topics in Science and Technology Studies
Fall, Spring. 4(4-0) P:M: (LBS 133) and completion of Tier I writing requirement. R: Open only to students in Lyman Briggs School majors. SA: LBS 239
Topics in history, sociology, and philosophy of science and technology. Science policy.

331 Literature and Science
Spring. 4(4-0) P:M: Completion of Tier I writing requirement. R: Open only to sophomores or juniors or seniors in Lyman Briggs School.
Representations of science and technology in texts drawn from science fiction, Gothic, and utopian literature or mainstream writings.

332 Technology and Culture
Fall. 4(4-0) Interdepartmental with American Studies. P:M: Completion of Tier I writing requirement. R: Open only to juniors or seniors in the American Studies major in Lyman Briggs School.
History of technology with special emphasis on the interaction of technical innovation and other elements of culture.

333 Topics in History of Science
Fall, Spring. 4(4-0) A student may earn a maximum of 8 credits in all enrollments for this course. P:M: Completion of Tier I writing requirement. R: Open only to juniors or seniors in Lyman Briggs School.
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
Spring. 4(4-0) P:M: Completion of Tier I writing requirement. R: Open only to sophomores or juniors or seniors in Lyman Briggs School.
Science and technology in public policy formation considered from the perspectives of the history, philosophy, and sociology of science and technology.

335 The Natural Environment: Perceptions and Practices
Spring. 4(4-0) Interdepartmental with American Studies. P:M: Completion of Tier I writing requirement. R: Open only to sophomores or juniors or seniors in the American Studies major or in Lyman Briggs School.
American attitudes toward the natural environment and related public and private institutions.

336 Gender, Science, Technology (W)
Fall. 4(4-0) P:M: Completion of Tier I writing requirement. RB: (LBS 144 and LBS 145) R: Open only to juniors or seniors in Lyman Briggs majors.
Impacts of gender on the development of sciences and technologies; feminist critiques of science and technology; barriers to women's participation in science and technology; scientific constructions of sex, gender, and sexuality.

347 Advances in Applied Biology
Fall. 3(2-3) P:M: (LBS 145) or (BS 111 or concurrently and BS 111L) or (LBS 149H or concurrently and LBS 159H) and completion of Tier I writing requirement. R: Open only to juniors or seniors in Lyman Briggs School.
Advances in cell and molecular biology and application: plant and animal breeding, environment, and therapeutics.

355 Philosophy of Technology
Spring. 4(4-0) Interdepartmental with Philosophy. P:M: Completion of Tier I writing requirement. R: Open only to sophomores or juniors or seniors in Lyman Briggs School or the Department of Philosophy.
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 Department of Sociology. RB: (LBS 133) or some familiarity with basic concepts and methods in sociology. R: Not open to freshmen or sophomores.
Role of science and technology in social change. Values and ethics in contemporary perspectives, controversies, and cases. Science and technology as forms of knowledge.

425 American and European Health Care since 1800
Spring. 4(4-0) Interdepartmental with History. Administered by Department of History. P:M: 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.

483 Literature and Medicine
Spring. 3(3-0) Interdepartmental with English. Administered by Department of English. P:M: Completion of Tier I writing requirement. R: Not open to freshmen or sophomores.
Human dimensions of medicine as seen in literature. Health, illness, mortality. Medical dilemmas. Physical and psychological self. Psychological theories used in interpreting literature.

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 only to juniors or seniors in Lyman Briggs School.
Directed advanced studies involving at least two LBS curricular areas: biology, chemistry, physics, mathematics, science and technology studies, 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 only to juniors or seniors in Lyman Briggs School.
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 only to juniors or seniors in Lyman Briggs School.
Directed advanced studies in chemistry or physics.

490D Advanced 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: Not open to freshmen or sophomores. Open only to Lyman Briggs School majors.
Directed advanced studies in mathematics.

490E Advanced Directed Study--Science and Technology Studies
Fall, Spring. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Open only to juniors or seniors in Lyman Briggs School.
Directed advanced studies in science and technology studies.

492 Senior Seminar
Fall, Spring. 4(4-0) RB: (LBS 239 or LBS 330 or LBS 331 or LBS 332 or LBS 333 or LBS 334 or LBS 335 or LBS 355 or LBS 490E or HST 425 or ENG 483) and completion of Tier I writing requirement. R: Open only to juniors or seniors in Lyman Briggs School.
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. 1 to 10 credits. A student may earn a maximum of 10 credits in all enrollments for this course. R: Open only to juniors or seniors in Lyman Briggs School.
Experiential learning related to the public or private practice of science and technology.

MANAGEMENT MGT

Department of Management
The Eli Broad College of Business and The Eli Broad Graduate School of Management

293 Cooperative Education for Business Students
Fall, Spring. 1(1-0) A student may earn a maximum of 3 credits in all enrollments for this course. Interdepartmental with Marketing and Supply Chain Management; Accounting; Economics; Finance; Hospitality Business. Administered by Department of Marketing and Supply Chain Management. R: By permission of the Department only.
Integration of pre-professional educational employment experiences in industry and government with knowledge and processes taught in the student's academic program. Educational employment assignment approved by the Department of Marketing and Supply Chain Management.

315 Managing Human Resources and Organizational Behavior
Fall, Spring, Summer. 3(3-0) R: Open only to juniors or seniors in the College of Business and to students in programs for which MGT 315 is a catalog-listed requirement. Not open to students in The School of Hospitality Business. SA: MGT 310
Formulation and administration of human resource policies in the business enterprise. Personnel planning, job analysis and evaluation, staffing. Compensation and labor relations. Employee safety. Training, development, and performance appraisal. Issues of diversity and ethics.

325 Management Skills and Processes
Fall, Spring, Summer. 3(3-0) R: Open only to juniors and seniors in programs for which MGT 325 is a catalog-listed requirement. SA: MGT 302
Managerial skills and processes in goal-directed institutions.

409 Business Policy and Strategic Management
Fall, Spring, Summer. 3(3-0) R: Open only to seniors in the College of Business. Not open to students in The School of Hospitality Business.
Techniques for building and maintaining consistent and effective policy and strategy. Major functions within a firm. Strategic integration, ethics, and international competition.

411 Organizational Staffing
Fall. 3(3-0) P:M: (MGT 315 or concurrently) R: Open only to juniors or seniors in The Eli Broad College of Business. Not open to students in The School of Hospitality Business.
Job and organizational analysis. Personnel planning, recruitment, selection and placement. Employment interviewing and testing. Validation of selection procedures, equal opportunity employer (EEO) guidelines, and affirmative action. Issues and diversity of ethics.

412 Compensation and Reward Systems
Spring. 3(3-0) P:M: (MGT 315 or concurrently) R: Open only to juniors or seniors in The Eli Broad College of Business. Not open to students in The School of Hospitality Business.
Designing compensation systems. Job evaluation, internal and external equity. Pay-for-performance plans and financial incentives. Wage and salary surveys. Benefits administration. Diversity and ethical considerations.

413 Personnel Training and Development
Spring. 3(3-0) P:M: (MGT 315 or concurrently) R: Open only to juniors or seniors in The Eli Broad College of Business. Not open to students in The School of Hospitality Business.
Designing and implementing training and development programs. Career stages and career planning. Needs analysis. Experimental design and program evaluation. Learning theories. Issues and diversity of ethics.

414 Diversity in the Workplace
Fall. 3(3-0) P:M: (MGT 315 or concurrently) R: Open only to juniors or seniors in The Eli Broad College of Business. Not open to students in The School of Hospitality Business.
Problems experienced by racial, ethnic, physically disabled, and other minorities in work organizations. Awareness training for managers. Ethical issues.