College of Arts and Sciences Requirements

In addition to meeting the entrance requirement in foreign language (two years of high school language, one year of college language, or demonstrated equivalent proficiency), candidates in the College of Arts and Sciences (all B.A., B.S., B.A.P.E. [excluding B.A.P.E. with certification], and B.S.P.E. degrees) must meet Option 1, 2, or 3 below.

Candidates for the B.A. in English, for the B.A. in Education with concentration in English, for the B.A. in Global Studies, and for election to the Areté Society must meet Option 1.

Option 1: Completion of one foreign language through the second year of college level. This option may also be met by completion of four years of high school study in one foreign language with grades of C or higher, or by satisfactory scores on a proficiency examination administered by the PLU Department of Languages and Literatures.

Option 2: Completion of one foreign language other than that used to satisfy the foreign language entrance requirement through the first year of college level. This option may also be met by satisfactory scores on a proficiency examination administered by the PLU Department of Languages and Literatures.

Option 3: Completion of four semester hours in history, literature, or language (at the 201 level, or at any level in a language other than that used to satisfy the foreign language entrance requirement) in addition to courses applied to the general university requirements, and four semester hours in symbolic logic, mathematics (courses numbered 100 or above), computer science, or statistics in addition to courses applied to the general university requirements.

Courses used to satisfy either category of Option 3 of the College of Arts and Sciences requirement may not also be used to satisfy general university requirements.

Recognized Majors:

Anthropology
Applied Physics
Art
Biology
Chemistry
Chinese Studies *(Interdisciplinary)*
Classical Languages *(Interdepartmental)*
Classical Studies *(Interdepartmental)*
Communication Studies
Computer Engineering
Computer Science
Economics
Engineering Dual Degree(3-2)
English
Environmental Studies *(Interdisciplinary)*
French
Geosciences
German
Global Studies *(Interdisciplinary)*
Hispanic Studies
History
Individualized Study
Mathematics
Mathmatical Education
Mathmatical, Financial
Music
Norwegian
Philosophy
Physics
Political Science
Psychology
Religion
Scandinavian Area Studies *(Interdisciplinary)*
Social Work
Sociology
Theatre
Women's and Gender Studies *(Interdisciplinary)*

Biology

253.535.7561
www.nsci.plu.edu/biol
biology@plu.edu

To learn biology is more than to learn facts: it is to learn how to ask and answer questions, how to develop strategies that might be employed to obtain answers, and how to recognize and evaluate the answers that emerge. The department is therefore dedicated to encouraging students to learn science in the only way that it can be effectively made a part of their thinking: to independently question it, probe it, try it out, experiment with it, experience it.

The diversity of courses in the curriculum provides broad coverage of contemporary biology and allows flexible planning. Each biology major completes a three-course sequence in the principles of biology. Planning with a faculty advisor, the student chooses upper-division biology courses to meet individual needs and career objectives. Faculty members are also committed to helping students investigate career opportunities and pursue careers that most clearly match their interests and abilities. Students are invited to use departmental facilities for independent study and are encouraged to participate in ongoing faculty research.

Faculty: M. Smith, *Chair*; Alexander, Auman, M.D. Behrens, Carlson, Crayton, Dolan, Egge, Ellard-Ivey, Laurie-Berry, Lerum, Main, Siegesmund, J. Smith, Teska.

BACHELOR OF ARTS or
BACHELOR OF SCIENCE MAJOR

For either the Bachelor of Arts or Bachelor of Science degree, the student must take our introductory core sequence (BIOL 125 and 126) and a semester of Genetics (BIOL 332). Completion of the two-course introductory core is required before upper-division biology courses can be taken. furthermore, BIOL 332 must be completed within five semesters of starting the introductory core series. To ensure breadth of study in biology, students must complete at least one upper-division course in each of the three categories below. In addition, at least one upper-division course must be taken that is botanical in nature and one that is zoological in nature. The two upper-division courses that satisfy the botanical and zoological requirements could also fulfill corresponding distribution requirements. Each of the courses taken for the biology major including the required supporting courses must be completed with a grade of C- or higher and the cumulative GPA must be at least 2.00. Courses not designed for biology majors (BIOL 111, 116, 201, 205, 206) ordinarily cannot be used to satisfy major requirements. Independent study (BIOL 491) and internship (BIOL 495) may be used for no more than a total of four of the upper-division biology hours required for the B.S. degree, and for no more than a total of two of the upper-division biology hours required for the B.A. degree. Students who plan to apply biology credits earned at other institutions toward a PLU degree with a biology major should be aware that at least 14 hours in biology, numbered 300 or higher and including 499, must be earned in residence at PLU.

Each student must consult with a biology advisor to discuss selection of electives appropriate for educational and career goals. Basic requirements under each plan for the major are listed below.

BACHELOR OF ARTS
34 semester hours in Biology

- BIOL 125, 126, 332, and 499
  - ***Plus:*** 20 additional upper-division biology hours that satisfy the following requirements:

    Cellular and Molecular Biology (One course):
    (BIOL 328, 348, 403, 407, 444, or 448)

    Organism Structure and Function (One course):
    (BIOL 324, 327, 361, 364, 365, or 441)

    Ecology and Evolution (One course):
    (BIOL 326, 333, 340, 424, 425, 427, or 475

    At least one upper-division course must be botanical in nature. Courses satisfying this requirement are: BIOL 340, 364, and 365.

    At least one upper-division course must be zoological in nature. Courses satisfying this requirement are: BIOL 324, 326, 327, 329, 361, and 441.

  - Required supporting courses; CHEM 115 and MATH 140
  - Recommended supporting courses: PHYS 125 (with 135 Lab) and PHYS 126 (with 136 Lab).

BACHELOR OF SCIENCE
42 semester hours in Biology

- BIOL 125, 126, 332, and 499
  - ***Plus:*** 28 additional upper-division biology hours that satisfy the following requirements:

    Cellular and Molecular Biology (One course):
    (BIOL 328, 348, 403, 407, 444, or 448)

    Organism Structure and Function (One course):
    (BIOL 324, 327, 361, 364, 365, or 441)

    Ecology and Evolution (One course):
    (BIOL 326, 333, 340, 424, 425, 427, or 475

    At least one upper-division course must be botanical in nature. Courses satisfying this requirement are: BIOL 340,k 364, and 365.

    At least one upper-division course must be zoological in nature. Courses satisfying this requirement are: BIOL 324, 325, 326, 327, 361, and 441.

  - Required supporting courses:

    CHEM 115 and 116, 331 (with 333 Lab).
    MATH 151
    PHYS 125 (with 135 Lab) or PHYS 153 (with 163 Lab)
    PHYS 126 (with 136 Lab) or PHYS 154 (with 164 Lab)

BIOLOGY SECONDARY EDUCATION
Students planning to be certified to teach biology in high school should plan to complete a B.A. or B.S. in biology. Upper-division biology course selection should be made in consultation with a biology advisor. See the Department of Instructional Development and Leadership section of the catalog for biology courses required for certification.

MINOR

- At least 20 semester hours selected from any biology courses.
- A grade of C- or higher must be earned in each course, and total Biology GPA must be at least 2.00.
- Course prerequisites must be met unless written permission is granted in advance by the instructor.
- Applicability of non-PLU biology courses will be determined by the department chair.
- At least eight of the 20 credit hours in biology must be earned in courses taught by the Biology Department at PLU
- For students applying only eight PLU biology hours toward the minor, those hours cannot include independent study (BIOL 491) or internship (BIOL 495) hours.

To view Biology course list, see the PLU Directory of Approved Courses beginning on page 154.

Business, School of

253.535.7244
www.plu.edu/busa
business@plu.edu

MISSION
The School of Business provides a supportive learning experience that challenges each student to: a) acquire relevant business skills, b) apply them to create sustainable value, and c) prepare for a purposeful life of achievement, inquiry, integrity, leadership, and service. We are especially committed to scholarship, innovation, and a global perspective.

See Graduate Studies for information on the Master of Business Administration program or visit the School of Business M.B.A. website at ***www.plu.edu/mba***.

AFFILIATIONS
The PLU School of Business is a member of AACSB International -The Association to Advance Collegiate Schools of Business. The B.B.A., M.B.A. and professional accounting programs are nationally accredited by AACSB International. The school is privileged to have a student chapter of Beta Gamma Sigma, the national business honor society recognized by AACSB.

Faculty: Brock, *Dean;* Pratt, *Associate Dean*; Albers, Barnowe, Berniker, Boeh, Chang, Gibson, Harmon, Lee, MacDonald, Massoud, Mobus, Myers, Ptak, Simpson, Tuzovic, Van Wyhe, Wittenberg, Zabriskie.

Biology (BIOL)

Terms	*Courses*
Fall	BIOL 111, 125, 201, 205, 323, 324, 326, 407, 424, 441, 475, 491, 495, 499
January Term	BIOL 116, 333, 365, 491, 495, 499
Spring	BIOL 125, 126, 206, 325, 327, 328, 332, 340, 348, 361, 364, 403, 425, 444, 448, 491, 499
Summer	BIOL 111, 205, 206, 491, 495
Alternate Yrs	BIOL 333 (J Term)

BIOL 111: Biology and the Modern World – NS, SM
This course is intended to introduce students to the principles and concepts that pertain to all living organisms, with special emphasis on those topics typically encountered in everyday life, including human physiology and disease, environmental issues, and the fundamentals of genetics. Lecture and laboratory. Not intended for biology majors. (4)

BIOL 116: Introductory Ecology – NS, SM
A study of the interrelationships between organisms and their environment examining concepts in ecology that lead to understanding the nature and structure of ecosystems and how humans impact ecosystems. Includes laboratory. Not intended for biology majors. (4)

BIOL 125: Molecules, Cells, and Organisms - NS, SM
An introduction to the concepts and study of the molecular, cellular, and organismal levels of biological organization. Cell structure and function, energy transformation, the central dogma of molecular biology, plant and animal anatomy and physiology, response to environmental changes, plant and animal reproduction and development. Includes laboratory. Co-registration or completion of CHEM 115 is recommended. (4)

BIOL 126: Genes, Evolution, Diversity, and Ecology - NS, SM
An introduction to the concepts and study of Mendelian and population genetics, evolution, ecology, and a systematic survey of life on earth. Includes laboratory. ***Prerequisite:*** BIOL 125 with a C- or better. (4)

BIOL 201: Introductory Microbiology – NS, SM
The structure, metabolism, growth, and genetics of microorganisms, especially bacteria and viruses, with emphasis on their roles in human disease. Laboratory focuses on cultivation, identification, and control of growth of bacteria. ***Prerequisite:*** CHEM 105. Not intended for biology majors. (4)

BIOL 205: Human Anatomy and Physiology I – NS, SM
The first half of a two-course sequence. Topics include matter, cells, tissues, and the anatomy and physiology of four systems: skeletal, muscular, nervous, and endocrine. Laboratory includes cat dissection and experiments in muscle physiology and reflexes. Not designed for biology majors. (4)

BIOL 206: Human Anatomy and Physiology II – NS, SM
The second half of a two-course sequence. Topics include metabolism, temperature regulation, development, inheritance, and the anatomy and physiology of five systems: circulatory, respiratory, digestive, excretory, and reproductive. Laboratory includes cat dissection, physiology experiments, and study of developing organisms. Not designed for biology majors. ***Prerequisite:*** BIOL 205. (4)

BIOL 323: Ecology, Evolution, and Diversity – NS, SM
Evolution, ecology, behavior, and a systematic survey of life on earth. Includes laboratory. ***Prerequisite:*** BIOL 126 or consent of department chair. (4)

BIOL 324: Natural History of Vertebrates
A systematic survey of vertebrate diversity including fishes, amphibians, non-avian reptiles, and mammals. Coverage emphasizes phylogenetic relationships, evolutionary trends, natural history, and anatomy. Field trips and laboratory focus on observation and identification of local species. ***Prerequisite:*** BIOL 126 (or 323). (4)

BIOL 325: Invertebrate Zoology
The study of invertebrate animals emphasizing their classifcation, anatomy, physiology and natural history. Coverage will also include the economic and human health importance of select groups. Laboratory emphasis on identification, taxonomy and anatomy. Field trips to observe living representatives. ***Prerequisite:*** BIOL 126 or consent of instructor. (4)

BIOL 326: Animal Behavior
Description, classification, cause, function, and development of the behavior of animals emphasizing an ethological approach and focusing on comparisons among species. Includes physiological, ecological, and evolutionary aspects of behavior. ***Prerequisite:*** BIOL 126 (or 323) or consent of instructor. (4)

BIOL 327: Ornithology
The study of birds inclusive of their anatomy, physiology, behavior, ecology and distribution. Special emphasis on those attributes of birds that are unique among the vertebrates. Laboratory emphasis on field identification, taxonomy, and anatomy/topology. ***Prerequisite:*** BIOL 126 (or 323) or consent of instructor. (4)

BIOL 328: Microbiology
The structure, physiology, genetics, and metabolism of microorganisms with emphasis on their diversity and ecology. The laboratory emphasizes design, implementation, and evaluation of both descriptive and quantitative experiments as well as isolation of organisms from natural sources. ***Prerequisite:*** BIOL 126 (or 323); one semester organic chemistry recommended. (4)

BIOL 329: Entomology
Entomology is the scientific study of insects, the most diverse group of animals on earth. This course examines insect structure, physiology, ecology, and diversity. The laboratory emphasizes identification of the common orders and families of North American insects. ***Prerequisite:*** BIOL 126 (or 323). (4)

BIOL 332: Genetics
Basic concepts considering the molecular basis of gene expression, recombination, genetic variability, as well as cytogenetics, and population genetics. Includes tutorials and demonstration sessions. ***Prerequisite:*** BIOL 126 (or 323). (4)

BIOL 333: Comparative Ecology of Latin America
A comparative study of the structure and function of biotic communities, and the ecological and evolutionary forces that have shaped plants and animals. Topics include dispersal, natural selection, physiological ecology, natural history, and systematics. Conservation biology, development, and indigenous rights will be highlighted. Taught in Central or South America. ***Prerequisite:*** BIOL 126 (or 323) or consent of instructor. (4)

BIOL 340: Plant Diversity and Distribution
A systematic introduction to plant diversity. Interaction between plants, theories of vegetational distribution. Emphasis on higher plant taxonomy. Includes laboratory and field trips. ***Prerequisite:*** BIOL 126 (or 323). (4)

BIOL 348: Cell Biology
Focuses on cellular organization and function, enzyme kinetics, membrane structure and function, engergetics, signaling and cell cycle. Laboratory employs modern techniques including animal cell culture, cell fractionation, molecular, genetic, and biochemical assays, and microscopy (light, phase contrast, fluorescence). ***Prerequisite:*** BIOL 126 (or 323), and one semester of organic chemistry or consent of instructor. (4)

BIOL 361: Comparative Anatomy
Evolutionary history of the vertebrate body, introduction to embryology, and extensive consideration of the structural and functional anatomy of vertebrates. Includes laboratory dissections following a systems approach. Mammals are featured plus some observation of and comparison with human cadavers. ***Prerequisite:*** BIOL 126 (or 323). (4)

BIOL 364: Plant Physiology
Physiology of plant growth and interactions with the environment. Emphasis on model plants (Arabidopsis and rice) with generalizations to other species. Topics include: photosynthesis, morphogenesis, hormones, defense. Implications for agriculture and ecology will be explored. Includes laboratory. ***Prerequisite***: BIOL 126 (or 323); genetics or molecular biology recommended. (4)

BIOL 365: Plant Anatomy
Tissue organization and cellular details of stems, roots, and leaves of seed plants, with emphasis on development and function. Includes laboratory. ***Prerequisite:*** BIOL 126 (or 323). (2)

BIOL 387: Special Topics in Biology - NS (1-4)
Selected topics as announced by the department. May be repeated for credit. (1-4)

BIOL 403: Developmental Biology
The embryonic and larval development of multicellular organisms (primarily animals). Examples are chosen from popular contemporary model systems, and the emphasis is on cellular and molecular aspects of development. The laboratory includes descriptive and quantitative experiments, as well as student-planned projects. ***Prerequisite:*** BIOL 126 (or 323). (4)

BIOL 407: Molecular Biology
An introduction to molecular biology, emphasizing the central role of DNA: structure of DNA and RNA, structure and expression of genes, genome organization and rearrangement, methodology and applications of recombinant DNA technology. Laboratory features basic recombinant DNA techniques. ***Prerequisite:*** BIOL 126 (or 323). (4)

BIOL 424: Ecology
Organisms in relation to their environment, including organismal adaptations, population growth and interactions, and ecosystem structure and function. ***Prerequisite:*** BIOL 126 (or 323). (4)

BIOL 425: Marine Biology
The ocean as environment for plant and animal life; an introduction to the structure, dynamics, and history of marine ecosystems. Lab, field trips, and term project in addition to lecture. ***Prerequisite:*** BIOL 126 (or 323). (4)

BIOL 427: Conservation Biology and Management
Based upon the principles of population ecology and ecological genetics, an integrated study of the impacts of people on nature - specifically the diversity of plants and animals. Includes practical applications, techniques, and case studies in forest, fish, wildlife and land management. Laboratories and field trips concern resource management and use. Course may not be repeated for credit. ***Prerequisite:*** BIOL 126 (or 323) or consent of instructor. (4)

BIOL 441: Mammalian Physiology
An investigation of the principles of physiological regulation. Part I: fundamental cellular, neural, and hormonal mechanisms of homeostatic control; Part II: interactions in the cardiovascular, pulmonary, renal, and neuromuscular organ systems. Laboratory allows direct observation of physiological regulation in living animals. ***Prerequisites:*** BIOL 126 (or 323), CHEM 115; anatomy and biochemistry recommended. (4)

BIOL 444: Neurobiology
Neurobiology is the study of the nervous system and its relationship to behavior and disease. This course examines the structure and function of neurons and glia, neural development, gross organization of the brain, sensory and motor systems and higher functions such as learning, memory and speech. ***Prerequisite:*** BIOL 126. (4)

BIOL 448: Immunology
Consideration of the biology and chemistry of immune response, including theoretical concepts, experimental strategies and immunochemical applications. ***Prerequisites:*** Any two of the following courses in Biology: 328, 332, 348, 403, 407, 441. (4)

BIOL 475: Evolution
Evolution as a process: sources of variation; forces overcoming genetic inertia in populations; speciation. Evolution of genetic systems and of life in relation to ecological theory and earth history. Lecture and discussion. Term paper and mini-seminar required. ***Prerequisite:*** BIOL 126 (or 323). (4)

BIOL 495: Internship in Biology
An approved off-campus work activity in the field of biology with a private or public sector agency, organization, or company. Students will be expected to adhere to and document the objectives of a learning plan developed with and approved by a faculty sponsor. Credit will be determined by hours spent in the working environment and the depth of the project associated with the course of study. ***Prerequisites***: BIOL 126 (or 323) and consent of department chair. (1-4)

BIOL 499: Capstone: Senior Seminar – SR
The goal of this course is to assist students in the writing and presentation of a paper concerning a topic within biology that would integrate various elements in the major program. A proposal for the topic must be presented to the department early in the spring term of the junior year. The seminar may be linked to, but not replaced by field or laboratory independent study or internship experience. (2)

Business (BUSA) - Undergraduate

BUSA 200: Documenting Professional Development
Introduction to documenting professional competencies through development and maintenance of a digital portfolio. Required only of transfer students who have otherwise met the BUSA 201 content requirement. (1)

BUSA 201: Value Creation in the Global Environment
Understanding economic value creating activities and the demands of enterprise stakeholders in competitive markets within the global environment. Additionally, an introduction to documenting professional development (4)

BUSA 202: Financial Accounting
Accounting for financial performance for the use of external decision-makers considering investment in a business organization. Origins and uses of financial information; accounting concepts and principles; logic, content, and format of financial statements; accounting issues in the U.S. and other nations. ***Prerequisite:*** MATH 128. (3)

BUSA 203: Managerial Accounting
Introduction to the use of accounting data for decision making, managerial planning, and operational control. Topics include cost-volume-profit relationships, cost accounting methods, budgeting, and performance evaluations. Familiarity with Microsoft Excel or other spreadsheet software is required. ***Prerequisites:*** BUSA 202, CSCE 120 . (3)

Upper Division Prerequisites: All upper-division business courses have the following prerequisites: BUSA 201, 202, and 203; CSCE 120; ECON 101; MATH 128; STAT 231; or permission of School of Business Dean or his/her designate.

BUSA 302: Finance for Managers
Principles and procedures pertaining to business investment activity, financial decision-making, financial statement analysis, valuation, financial planning, capital asset acquisition, cost of capital, financing strategies ***Prerequisite:*** BUSA 203 (3)

BUSA 303: Business Law and Ethics
Explores the legal and ethical issues faced by those in the business environment. Provides foundation in U.S. and international law and introduces basic principles of contracts, torts, agency and business organizations. Surveys areas of law affecting employment, marketing, and financial transactions and explores the ethical duties owed in a business environment, including those duties under professional codes of ethics. (3)

BUSA 304: Law and Ethics for Financial Professionals
Designed for students whose interests are in finance, accounting, personal financial management, or similar fields that demand an in-depth understanding of the laws affecting financial transactions. Surveys all areas of business law, such as the basis and structure of U.S. and international law, principles of contracts, torts, agency, business organizations, and employment. Explores the ethical duties owed in a business environment, including those duties under professional codes of ethics. (3)

BUSA 305: Human Dimensions of Effective Organizations
Exploration of how to organize and manage in today's context of changing internal and external demands and expectations, with a strong emphasis on group and individual dynamics, and topics in managing human resources (3)

BUSA 308: Principles of Marketing
A study of marketing concepts, principles and trends in organizations with an emphasis on value creation by differentiation. (3)

BUSA 309: Creating Value in Goods and Services Operations
Study of the management and organization of sustainable value creating operations in the production of goods and services. (3)

BUSA 310: Information Systems
Introduction to information technology and information systems from a management perspective. Emphasis on strategic use of technology and systems, knowledge management, and impacts on corporate strategy, competition, organizational structure, and the firm's value creation process. (3)

BUSA 320: Accounting Information Systems
Study of the flow of information through an enterprise, the sources and nature of documents, and the controls necessary to insure the accuracy and reliability of information. ***Prerequisite:*** BUSA 202. (3)

BUSA 321: Intermediate Accounting I
Concentrated study of the conceptual framework of accounting, valuation theories, asset and income measurement, and financial statement disclosures in the U.S. and abroad. ***Prerequisite:*** BUSA 202. (3)

BUSA 322: Intermediate Accounting II
Additional study of valuation theory. Advanced issues in asset and income measurement and financial statement disclosure.