

design, manufacturing management, fashion design, fashion buying and merchandising, jewelry design, textile/surface design, or textile development and marketing.

Soongsil University (Seoul)

Seattle Pacific University and Soongsil University are sister schools. Students are able to study at each institution. Information is available from the Office of Student Life.

College of Arts and Sciences

Demaray Hall
(206) 281-2166

Bruce D. Congdon, *Dean of the College of Arts and Sciences*

The College of Arts and Sciences (CAS) at Seattle Pacific University offers undergraduate majors in 18 different disciplines and two graduate programs. As home to humanities, arts and social and natural sciences, the CAS provides a foundation of liberal learning and skills in reasoning, critical thinking and communication. Central to our mission is contributing to the formation of a mature Christian faith and the development of the whole person. Graduates of the College of Arts and Sciences are prepared for lives of continuing learning and responsiveness to a changing world.

The College of Arts and Sciences is comprised of 18 departments. For a complete list, please see page 65 of this *Catalog*. Each of those departments is also listed alphabetically in the following pages, along with their faculty members, contact information, course listings and more.

Bruce D. Congdon, Ph.D., Dean, College of Arts and Sciences, Professor of Biology B.S., College of the Ozarks, 1979; M.S., Colorado State University, 1981; Ph.D., University of California-Riverside, 1985. At SPU since 1985.

Accounting

See Business and Economics, School of

Anthropology

See Sociology

Art

Art Center
3 West Cremona
(206) 281-2205 or (206) 281-2079
www.spu.edu/depts/fpa/art/art_homepage.html

Bruce D. Congdon, *Dean of the College of Arts and Sciences*

Michael Caldwell, Chair, **Roger Feldman**, **Laura Lasworth**; **Virginia Causey**, **Nichole Fazio**, **Susan Haas**, **Susan Harris**, **Liza Halvorsen**, **Melissa Meier**, Adjunct Faculty

The purpose of the art program is (1) to acquaint students with the fundamental elements and principles of the visual arts and their use in either studio or visual communication arts; (2) to introduce students to the techniques of various traditional and technological

media; (3) to create an awareness in students of the value of art by presenting the proper historical and cultural background; and (4) to assist students in their exploration of the spiritual nature of art as an expression of their faith. The curriculum provides training in studio arts or visual communication that prepares students to pursue advanced study or begin work professionally.

Admission to the Major or Minor

Formal application for admission to a major or minor in art should be made upon completion of the specified freshman drawing and design course sequences (see below). In the case of a transfer student with class status beyond the sophomore level, application to the art major or art minor can be made after confirmation of successful completion of equivalent drawing and design course sequences. At the time of application the student must (1) designate her or his intention to pursue studies as an art major in either studio arts or visual communication, or as an art minor in studio arts; (2) submit a portfolio for review; and (3) must have a minimum 2.5 GPA in art courses. All studio art majors, as a condition of graduation, are required to participate in a Senior Exhibition during Spring Quarter of their senior year. All senior visual communication majors, as a condition of graduation, are required to participate during Spring Quarter of their senior year in the Visual Communication Portfolio Exhibition. Senior art majors must also, as a condition of graduation, provide the Art Department with a comprehensive photographic portfolio of work completed during their studies. The slides will be retained by the Art Department as part of the department slide library.

Requirements for the Art Major

Emphasis in Studio Arts

74 credits; 38 upper-division

Core Courses

Art 1102, 1103, 1104 Drawing Studio	9
Art 1202, 1203, 1204, 1205 Design Studio	12
Art 2302 Painting Studio	3
Art 2722 Sculpture Studio	3
Art 2421 Printmaking Studio	3

Studio Arts Emphasis

Art 3112 Figure Drawing	3
Art 4112 Figure Drawing — Advanced	3
Art 2428 Ceramics Studio	3
Art 2422 Metals Studio	3
Art History (three quarters of study required)	15
Art 4910 Senior Seminar and Exhibition	2
Art 4966 Senior Studio Project	6

Art Electives

Three quarters of study in areas of student choice; must be upper-division

9

Total **74**

Visual Communication

74 credits; 44 upper-division

Core Courses

Art 1102, 1103 Drawing Studio	6
Art 1202, 1203, 1205 Design Studio	9
Art 2201 Introduction to Computer Art	3
Art 2302 Painting Studio, Oil or Acrylic	3
Art 3112 Figure Drawing	3
Art 3604 History of Renaissance Art	5
Art 3605 History of Modern Art	5

Visual Communication Emphasis

Art 2205 Image Capture	3
Art 2208 Typography	3
Art 2502 Illustration	3
Art 3202 Visual Communication (Beginning Print)	3
Art 3204 Visual Communication (Advanced Print)	3
Art 3207 Information Architecture (Beginning Web)	3
Art 3502 Illustration, Advanced	3

Art 3610 History of Graphic Design	5
Art 4208 Interactive Media	1-3
Art 4210 Interactive Media	2-3
Art 4212 Motion Graphics	3
Art 4236 Portfolio	2
Art 4943 Art Internship	3
Total	74

Requirements for the Art Minor in Studio Arts

43 credits; 15 upper-division

Core Courses

Art 1102, 1103, 1104 Drawing Studio	9
Art 1202, 1203, 1204 Design Studio	9

Studio Arts Emphasis

Art 2302 Painting Studio	3
Art 2722 Sculpture Studio	3
Art 2421 Printmaking Studio	3
Art History (two quarters of study required)	10

Art Electives

Two quarters of study in areas of student choice; must be upper-division

Total	43
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Note: Art 1180 may not be used to meet a requirement for either the art major or art minor in studio arts. Information concerning concentrations for teacher preparation is available from the School of Education.

Art Courses

ART 1102 Drawing Studio (3) Studies the use of line, perspective, value and composition in the context of drawing as visual description based on observation and analysis of various motifs. Emphasizes linear drawing. Extra fee. Attributes: Arts and Humanities A; and Fine Arts Option. Class not open to juniors and seniors.

ART 1103 Drawing Studio (3) Studies the use of line, perspective, value and composition in the context of drawing as visual description based on observation and analysis of various motifs. Emphasizes tonal drawing. Extra fee. Attribute: Fine Arts Option. Class not open to juniors and seniors.

ART 1104 Drawing Studio (3) Studies the use of line, perspective, value and composition in the context of drawing as visual description based on observation and analysis of various motifs. Emphasizes composition of the pictorial space. Extra fee. Attribute: Fine Arts Option. Class not open to juniors and seniors.

ART 1180 The Visual Arts (5) Introduces and analyzes visual forms through lecture, observation and discussion. The nature of the visual arts is explored from the vantage points of the artist and viewer/critic. Attributes: Arts and Humanities A; and Fine Arts Core.

ART 1202 Design Studio (3) Applies the elements and principles of visual arts and design to two-dimensional projects in a variety of media emphasizing practical design problems. Emphasizes two-dimensional design. Extra fee.

ART 1203 Design Studio (3) Applies the elements and principles of visual arts and design to three-dimensional projects in a variety of media emphasizing practical design problems. Emphasizes three-dimensional design. Extra fee.

ART 1204 Design Studio (3) Applies the elements and principles of visual art and design to projects utilizing digital imaging and manipulation. Emphasis placed on digital media as tools for creating works of art. Extra fee. May be repeated for credit up to 6 credits. Class open to art majors. Class open to freshmen and sophomores.

ART 1205 Design Studio — Color (3) Presents an overview of the study of color and color relationships. Emphasis will be placed on the seven color contrasts as defined by Itten in *The Elements of Color*. Students will work with both paint and computer systems. Class open to art majors.

ART 2201 Introduction to Computer Art (3) Prerequisites: ART 1102, 1103, 1202, 1203, 1204. Overview and exploration of the rudimentary use of digital media as it relates to the production of visual communications. Extra fee.

ART 2205 Image Capture (3) Registration approval: Instructor. Prerequisite: ART 2201. Exploration of traditional and digital methods of capturing images for refinement, manipulation or reference. Extra fee.

ART 2208 Typography (3) Registration approval: Instructor. Prerequisite: ART 2201. Introduction to the communicative, symbolic and associative aspects of typography. Emphasis is placed upon the strategic use of typography as a primary design element. Extra fee. Class not open to freshmen.

ART 2302 Painting Studio (3) Analyzes problems in two-dimensional composition and the expression of volume on the two-dimensional plane emphasizing materials and techniques of water soluble oil painting. Extra fee. Attributes: Arts and Humanities A; and Fine Arts Option.

ART 2421 Printmaking Studio (3) Studies graphic art with projects in several printing media including relief and intaglio processes in woodcut, linocut, drypoint and etching, lithography and monoprint. Extra fee. Class not open to freshmen.

ART 2422 Metals Studio (3) Teaches the raising, soldering and forging of metals into utensils and decorative forms such as jewelry. Emphasizes fabrication. Extra fee. Attributes: Arts and Humanities A; and Fine Arts Option.

ART 2428 Ceramics Studio (3) Explores the design and construction of pottery. Projects include several handbuilding processes of construction, glazing, and loading and firing the kiln. Emphasizes handbuilding. Extra fee. Attributes: Arts and Humanities A; and Fine Arts Option. Class not open to freshmen.

ART 2502 Illustration (3) Prerequisites: ART 1102, 1103 and 1104. Introduction to the various problems, materials, techniques and processes utilized in professional illustration. Extra fee.

ART 2722 Sculpture Studio (3) Prerequisite: ART 1203. Studies of three-dimensional form and composition with the several media typically used in sculpture. Emphasizes additive and subtractive sculpture techniques. Extra fee. Class not open to freshmen.

ART 3112 Drawing Studio — Figure (3) Registration approval: Instructor. Prerequisites: ART 1102, 1103, 1104. Studies the problems of anatomical structure with sketching and drawing from the draped model. Extra fee. Attribute: Upper-Division. Class open to art and textiles, clothing and interiors majors. Class not open to freshmen.

ART 3202 Visual Communication I (3) Registration approval: Instructor. Prerequisites: ART 2201, 2205, 2208. Exploration of creative ideas, resources, digital processes, media and terminology in the development of visual communication solutions. Extra fee. Attribute: Upper-Division. Class open to art majors. Class not open to freshmen and sophomores.

ART 3204 Visual Communication II (3) Registration approval: Instructor. Prerequisite: ART 3202. Continues exploration of terminology, processes and theory in the development of design solutions for various forms of visual communication. Extra fee. Attribute: Upper-Division. Class open to art majors. Class not open to freshmen and sophomores.

ART 3207 Information Architecture — Beginning Web (3) Registration approval: Instructor. Prerequisites: ART 2208, 3204. Exploration of theoretical, practical and developmental aspects of information design. Focus on systematic aspects of commutativity and interactivity in preparation for designing in the electronic environment. Extra fee. Attribute: Upper-Division. Class open to art majors. Class not open to freshmen and sophomores.

ART 3302 Painting Studio Advanced I — Water Soluble Oil (3) Prerequisite: ART 2302 or permission of instructor. Emphasizes individual expression and the study of styles in various subject matter. Extra fee. Attribute: Upper-Division. Class not open to freshmen.

ART 3315 Painting Studio — Watercolor (3) Investigates a range of technical skills in the use of traditional watercolor. Attribute: Upper-Division.

ART 3421 Printmaking Studio — Advanced I (3) Prerequisite: ART 2421 or permission of instructor. Studies graphic art with projects in several of the printmaking media including serigraph, collograph and monoprint. Extra fee. Attribute: Upper-Division. Class not open to freshmen and sophomores.

ART 3422 Metals Studio — Advanced I (3) Prerequisite: ART 2422 or permission of instructor. Teaches the raising, soldering and forging of metals into utensils and decorative forms such as jewelry. Emphasizes forming. Extra fee. Attribute: Upper-Division. Class not open to freshmen.

ART 3428 Ceramics Studio — Wheel I (3) Prerequisite: ART 2428. Explores the design and construction of pottery. Projects include wheel processes of throwing, glazing, packing and firing the kiln. Emphasizes beginning wheel. Extra fee. Attributes: Arts and Humanities A; Fine Arts Option; and Upper-Division. Class not open to freshmen.

ART 3502 Image and Narration (3) Prerequisites: ART 1102, 1202, 3112, and 2302 or 2421. Investigates various forms of representation and their application to narrative content. Projects will emphasize the process of working from text to visual image in the form of illustration, computer art, painting and/or printmaking. Extra fee. May be repeated for credit one time. Attribute: Upper-Division. Class open to art majors. Class not open to freshmen and sophomores.

ART 3546 Art Education — Elementary (3) Discusses the principles and elements of art as related to a variety of media with direct application to use in the elementary classroom. Special emphasis on the role of art in the curriculum and understanding the perceptual development of children. Studio periods will be augmented with lectures and discussion. Attribute: Upper-Division. Class not open to freshmen and sophomores.

ART 3547 Art Education — Secondary (3) Studies the teaching of art in the secondary school with investigation of several appropriate media and emphasizing development of an art curriculum. Studio periods will be combined with lectures and discussions. Offered alternate years. Course equivalent: EDU 3358. Attribute: Upper-Division. Class not open to freshmen and sophomores.

ART 3602 History of Ancient Art (5) Explores the pictorial and plastic expression of the ancient Mediterranean cultures to the end of the Roman Empire. Offered alternate years. Attributes: Arts and Humanities A; Fine Arts Option; and Upper-Division. Class not open to freshmen.

ART 3603 History of Early Christian and Medieval Art (5) Explores the symbolic, pictorial and plastic expressions of the Early Christian and medieval periods. The course will also explore the art of Islam. Offered alternate years. Attributes: Arts and Humanities A; Fine Arts Option; and Upper-Division. Class not open to freshmen.

ART 3604 History of Renaissance and Baroque Art (5) Prerequisite: ART 3603 or permission of instructor. Explores the symbolic, pictorial and plastic expression of the Renaissance and Baroque periods. Offered alternate years. Attributes: Arts and Humanities A; Fine Arts Option; and Upper-Division. Class not open to freshmen.

ART 3605 History of Modern Art (5) Explores the plastic and pictorial expression of Europe and America from the 18th century to the present particularly emphasizing 20th century development. Offered alternate years. Attributes: Arts and Humanities A; Fine Arts Option; and Upper-Division. Class not open to freshmen.

ART 3606 History of Asian Art (5) Examines the art forms of Japan, Korea, China, India and Indian Asia. Offered alternate years. Attributes: Arts and Humanities A; Fine Arts Option; and Upper-Division. Class not open to freshmen.

ART 3607 History of American Art (5) Provides a survey of American art from Colonial times to the present, covering architecture, painting and sculpture. Offered alternate years. Attributes: Arts and Humanities A; Fine Arts Option; and Upper-Division. Class not open to freshmen.

ART 3610 History of Graphic Design (5) Registration approval: Instructor. Survey of historical roots of typography, illustration and graphic design to the present. Issues, ideas and designer/artists act as vehicles for investigation. Attributes: Upper-Division; and Writing Course. Class open to art majors. Class not open to freshmen and sophomores.

ART 3722 Sculpture Studio — Advanced I (3) Prerequisite: ART 2722 or permission of instructor. Studies in development of composition and process with emphasis on refining media appropriate to conceptual development. Extra fee. Attribute: Upper-Division. Class not open to freshmen and sophomores.

ART 4112 Drawing Studio — Advanced (3) Registration approval: Instructor. Prerequisites: ART 1102, 1103, 1104, 3112. Advanced studies of sketching and drawing from the draped model. Extra fee. May be repeated for credit up to 6 credits. Attribute: Upper-Division. Class not open to freshmen and sophomores.

ART 4208 Interactive Media I (3) Registration approval: Instructor. Prerequisite: ART 3204. Introduction to the tools, processes and strategies for Internet design. Concentration on fundamental properties of the electronic environment, along with development of appropriate skill base. Extra fee. Attribute: Upper-Division. Class open to art majors. Class not open to freshmen and sophomores.

ART 4210 Interactive Media II (3) Registration approval: Instructor. Prerequisite: ART 4208. Continued development of design aspects related to the Internet and interactive media. Emphasis placed on strategic use of theory, methodology and refinement in the development of electronic interactive Web sites. Extra fee. Attribute: Upper-Division. Class open to art majors. Class not open to freshmen and sophomores.

ART 4212 Motion Graphics (3) Registration approval: Instructor. Prerequisite: ART 4210. Exploration and focus upon utilization of movement as a design element in the interactive electronic environment. Investigation of primitive to sophisticated uses of animation as a communicative instrument. Extra fee. Attribute: Upper-Division. Class open to art majors. Class not open to freshmen and sophomores.

ART 4236 Portfolio (2) Instruction in the development of a professional portfolio including résumé and cover-letter writing and presentation of samples of creative work. Attribute: Upper-Division. Class open to visual arts majors.

ART 4302 Painting Studio — Advanced II (3) Registration approval: Instructor. Prerequisites: ART 2302, 3302. Extra fee. May be repeated for credit two times. Attribute: Upper-Division. Class open to visual arts majors. Class open to juniors and seniors.

ART 4421 Printmaking Studio — Advanced II (3) Prerequisites: ART 2421, 3421 or permission of instructor. Studies graphic art with projects in several of the printing media including woodcut, serigraph and collagraph. Extra fee. May be repeated for credit one time. Attribute: Upper-Division. Class not open to freshmen and sophomores.

ART 4422 Metals Studio — Advanced II (3) Prerequisites: ART 2422, 3422 or permission of instructor. Teaches the raising, soldering and forging of metals into utensils and decorative forms such as jewelry. Emphasizes casting. Extra fee. May be repeated for credit two times. Attribute: Upper-Division. Class not open to freshmen and sophomores.

ART 4428 Ceramics Studio — Wheel II (3) Prerequisite: ART 3428 or permission of instructor. Explores the design and construction of pottery. Projects include wheel processes of construction, glazing, and loading and firing the kiln. Emphasizes advanced wheel. Extra fee. May be repeated for credit two times. Attributes: Arts and Humanities A; Fine Arts Option; and Upper-Division. Class not open to freshmen.

ART 4608 Issues in Contemporary Art (5) A study of art produced since 1970 focusing on current art movements and their relationship to changing societal values. Course structure includes both lecture/discussion and studio-oriented experiences. May be repeated for credit one time. Attributes: Upper-Division; and Writing Course. Class not open to freshmen and sophomores.

ART 4722 Sculpture Studio — Advanced II (3) Prerequisite: ART 3722 or permission of instructor. Studies of three-dimensional form and composition with emphasis on site-specific sculpture, installation art and art in the public place. Extra fee. May be repeated for credit two times. Attribute: Upper-Division. Class not open to freshmen and sophomores.

ART 4900 Independent Study (1–5) Registration approval: Independent Study Agreement. Student works independently with a faculty member on a mutually agreed upon topic. May be repeated for credit up to 15 credits. Attribute: Upper-Division.

ART 4910 Senior Seminar and Exhibition (2) Prerequisite: Senior standing with a major in art or permission of instructor. Deals with preparation of the senior exhibition and explores the problems of setting up a studio and working professionally. Attribute: Upper-Division. Class open to art, fine and applied arts and visual arts majors. Class not open to freshmen, sophomores and juniors.

ART 4920 Readings in Art (1–5) Registration approval: Independent Study Agreement. May be repeated for credit up to 15 credits.

Attributes: Upper-Division; and Writing Course. Class open to visual arts majors. Class not open to freshmen, sophomores and juniors.

ART 4943 Art Internship (1–5) Registration approval: Intern Learning Contract Req. An opportunity for art students to gain additional proficiency and experience in an approved project of the student's own design. May be repeated for credit up to 20 credits. Attribute: Upper-Division. Class not open to freshmen and sophomores.

ART 4950 Special Topics in Art (1–5) Registration approval: Instructor. May be repeated for credit up to 15 credits. Attribute: Upper-Division. Class open to visual arts majors. Class not open to freshmen, sophomores and juniors.

ART 4966 Senior Studio Project (2) Senior self designs and completes, over the academic year, a visual arts project that will form the core of the work he or she displays in the Senior Exhibition. Students must register for this course for each quarter of their senior year. May be repeated for credit up to 6 credits. Attribute: Upper-Division. Class open to art, fine and applied arts and visual arts majors. Class not open to freshmen, sophomores and juniors.

Faculty

Michael Caldwell, Professor of Art; B.S., University of Oregon, 1968; M.F.A., 1970. At SPU since 1970.

Roger Feldman, Professor of Art; B.A., University of Washington, 1972; M.F.A., Claremont Graduate University, 1977. At SPU since 2000.

Laura Lasworth, Professor of Art, B.F.A., The School of the Art Institute of Chicago, 1977; M.F.A., California Institute of the Arts, 1980. At SPU since 2002.

Biochemistry

See Chemistry

Biology

Science Building
(206) 281-2351
www.spu.edu/depts/biology/

Bruce D. Congdon, *Dean of the College of Arts and Sciences*

Richard L. Ridgway, Chair, **Cynthia R. Bishop**, **Cynthia L. Fitch**,
A. Kenneth Moore, **Timothy Nelson**

The primary goals of the Department of Biology are (1) to cultivate students who understand and respect scientific approaches to the study of life; (2) to produce graduates who demonstrate excellence in their scientific training; (3) to prepare graduates to think critically, to communicate biological principles effectively and to make informed decisions based on a solid understanding of science and their Christian worldview; and (4) to embolden faculty and students to lead lives of grace-filled wholeness, and personal and professional integrity.

Admission to the Major

The application for major status should be made by the beginning of the junior year, after completion of the sequence in general biology. Transfer students are eligible to apply after successful completion of one 5-credit upper-division biology course at SPU. Applications are considered individually by the biology faculty, but the normal minimum requirement for admission will be a GPA of 2.5 in biology courses.

Requirements for the Biology Major

There are five tracks for biology majors, three leading to the B.S. degree and two leading to a B.A. degree. The requirements for each track are described below and in the summary table.

B.S. in Biology

Option I

102 credits; 35 upper-division in biology

This major provides preparation for graduate studies or professional careers in biology. It places special emphasis on undergraduate research. Depending upon interests and professional goals, a student may choose the core and elective coursework to emphasize botany, cellular and molecular biology, ecology, marine biology, physiology or zoology. In addition to the core and supporting requirements indicated below, 14 credits of biology elective courses are also required. Elective courses should be discussed with biology faculty advisors. General physics is also strongly recommended. As a part of either core requirements or electives, students are required to take a minimum of 3 credits of field biology, taught primarily in the field and emphasizing field methods. Seattle Pacific field biology courses are BIO 4117, BIO 4735, BIO 4740, BIO 4744, BIO 4810, BIO 4815, BIO 4820, BIO 4825, BIO 4830, BIO 4835, BIO 4880 and BIO 4950. An undergraduate research project is required for graduation. Each student will collaborate with a faculty member on an investigation that requires a formal proposal (BIO 4978 Biological Research Proposal), and original research and presentation of results (BIO 4979).

Option II: Emphasis in Human Biology

107 credits

This program is designed primarily for those students planning to enter a master's degree program in physical therapy. This highly interdisciplinary curriculum will satisfy the basic requirements for entry into physical therapy as outlined by the American Association of Physical Therapists. In addition to the requirements listed below, 10 elective credits are required from the following: BIO 3325, 3434, 4256, 4413 and 4418. Other recommended courses include FCS 3340, HSC 3395, MAT 1112/1114 or 1221, PE 3590 and SOC 1110.

Option III: Emphasis in Biotechnology/Molecular Biology

108–128 credits; 26–28 upper-division in biology

This program is specifically designed to aid students in developing competency in the laboratory skills typically needed for entry into a career in biotechnology. The program curriculum was developed with the help of regional biotechnology industry representatives as part of the Washington State Biotechnology/Biomedical Skill Standards Project (1999–2002) and features a unique “two-way” articulation agreement with Shoreline Community College's Biotechnology Program. To be considered for this B.S. biology pathway, students must apply and be accepted into the SPU program in biotechnology; application and acceptance must be made prior to

enrolling in any upper-division biology, chemistry or biochemistry courses within the biotechnology curriculum. Prospective students should contact the director of the program in biotechnology for more information.

B.A. in Biology

Option I: Emphasis in Cell and Molecular Biology

87 credits; 25 upper-division in biology

The program provides a sound foundation for pre-professional training for medicine, dentistry, optometry, veterinary sciences, as well as certain other health related and applied biology fields. Other courses in chemistry, physics and mathematics should be taken to meet the demand of the student's individual plans or career goals. See additional information under Pre-Professional Health Programs.

In addition to the requirements listed in the summary table below and on page 78, 25 elective credits are required. Of these, 15 credits shall be selected from the following courses:

BIO 3320 Principles of Development
 BIO 3350 Immunology
 BIO 4325 Molecular Biology
 BIO 4330 Evolutionary Mechanisms
 BIO 4361/4362 Bio Chemistry
 BIO 4418 Neurobiology
 BIO 4420 Histology and Microscopic Technology
 BIO 4615 Issues and Values in Biology

The remaining 10 credits shall be selected from the following courses:

BIO 2129/2130 Anatomy and Physiology
 BIO 3432 Biodiversity: Vertebrate Biology
 BIO 4413 Animal Physiology or BIO 4415 Plant Physiology

Option II

80 credits; 30 upper-division in biology

This program is designed to provide a broad foundation in biology for liberal arts students and those preparing for the teaching profession at the junior high school or secondary level. Students preparing for biology teaching careers should become familiar with Washington state endorsement requirements prior to selecting core and elective options. Current endorsement requirements include (1) a botany course with lab (satisfied by BIO 3453, 3456, 4415 or 4744); (2) a zoology course with lab (satisfied by BIO 3432, 4413 or 4740); (3) a genetics course (BIO 3325); (4) a microbiology with lab (BIO 3351) or cell biology with lab (BIO 4352); (5) an ecology course (satisfied by BIO 3310, 4810, 4815 or 4825); (6) an evolution course (BIO 4330); (7) a chemistry course with lab (e.g., CHM 1211 or 3371); (8) experience in lab safety, practice and management (satisfied by BIO 2101, 2102 and 2103); (9) experience with inquiry-based laboratories (satisfied by upper-division biology lab courses; and (10) experience in relating science to current issues (satisfied by BIO 4615 and BIO 4899).

Required Courses	B.S. I	B.S. II	B.S. III	B.A. I	B.A. II
BIO 2101 General Biology	5	5	5	5	5
BIO 2102 General Biology	5	5	5	5	5
BIO 2103 General Biology	5	5	5	5	5
BIO 2129 Anatomy and Physiology		5			
BIO 2130 Anatomy and Physiology		5			
BIO 2600 Biotechnology Seminar			1		
BIO 3325 Genetics	5		5	5	5
BIO 3350 Immunology			3		
BIO 3351 General Microbiology		5	5		
BIO 4325 Molecular Biology			5		
BIO 4352 Cell Biology	5		5	5	
BIO 4330 Evolutionary Mechanisms	3				3
Physiology Core (BIO 4413 or BIO 4415)	5				5

Required Courses	B.S. I	B.S. II	B.S. III	B.A. I	B.A. II
Comparative Biology Core (BIO 3320, BIO 3432, BIO 3453, BIO 3456, BIO 4435, BIO 4740 <i>or</i> BIO 4744)	5				5
Ecology Core (BIO 3310, BIO 4810, BIO 4815 <i>or</i> BIO 4825)	5				5
Physiology BIO 4413 Animal Physiology <i>or</i> BIO 4415 Plant Physiology <i>or</i> BIO 4418 Neurophysiology			5		
BIO 4361 and 4362 Biochemistry			10		
BIO 4615 Issues and Values in Biology <i>or</i> BUS 3400 Business Ethics			3–5		3 (BIO 4615)
Field Biology Requirement (a minimum of 3 credits)	see page 77				
Undergraduate Research (a minimum of 3 credits)					
BIO 4978 (1) and BIO 4979 (2)	3				
BIO 4940 Internship in Biology			3–5		
BIO 4899 Capstone	2	2	2	2	2
Electives (biology courses)	14	10		25	12

Required Supporting Courses	B.S. I	B.S. II	B.S. III	B.A. I	B.A. II
CHM 1211 General Chemistry	5	5	5	5	5
CHM 1212 General Chemistry	5	5	5	5	5
CHM 1330 Organic and Biological Chemistry		5			
CHM 2540/3540 Introduction to Organic Chemistry	5	5		5	
CHM 3371 Organic Chemistry	5		5	5	5
CHM 3372 Organic Chemistry	5		5	5	5
CHM 3373 Organic Chemistry	5		5	5	recommended
CHM 3225 Chemical Equilibrium and Analysis			5		
CHM 2540/3540 Introductory Inorganic Chemistry <i>or</i> CHM 3225 Chemical Equilibrium and Analysis <i>or</i> BIO 4360 Biostatistics	5				
MAT 1221 Survey of Calculus <i>or</i> MAT 1225 and 1226	5–10		5–10	recommended	
Calculus, MAT 1360 Statistics <i>or</i> HSC 4044 Biomed Tests, Measurements and Stats	5	5	5	5	5
PE 3570 Biomechanics		5			
PE 3580 Exercise Physiology		5			
PHY 1101, 1102 and 1103 General Physics <i>or</i> PHY 1121, 1122 and 1123 Physics for Sci. and Eng.	recommended	15		recommended	
PSY 1180 General Psychology		5			
PSY 2470 Life Span Psychology <i>or</i> PSY 4420 Adolescent Developmental Psychology		5			
PSY 4460 Abnormal Behavior		5			
Required from Shoreline Community College BioSc 260 (4) and BioSc 285 (2)			6		
Total	102*	107*	108–128*	87*	80*

*No more than 6 credits of BIO 4950 or 5 credits in BIO 4900, 4930, 4940, 4978, or 4979 may be applied to a B.S. or B.A. degree in biology.

Requirements for the Biology Minor	
<i>34–38 credits; 15 upper-division</i>	
Required courses	
BIO 2101, BIO 2102 and BIO 2103 General Biology	15
BIO 4615 Issues and Values in Biology	3
A minimum of 8 credits each from two of the following four categories:	16–20
Molecular and Cellular Biology	
BIO 3325 Genetics (5)	
BIO 3350 Immunology (3)	
BIO 3351 General Microbiology (5)	
BIO 4325 Molecular Biology (5)	
BIO 4352 Cell Biology (5)	
Anatomy and Physiology	
BIO 2129 Human Anatomy and Physiology (5)	
BIO 2130 Human Anatomy and Physiology (5)	
BIO 4256 Environmental Physiology (5)	
BIO 4413 Animal Physiology (5)	
BIO 4415 Plant Physiology (5)	
BIO 4418 Neurobiology (5)	
BIO 4420 Histology and Microscopic Technology (5)	

Organismal Biology
BIO 3432 Biodiversity: Vertebrate Biology (5)
BIO 3434 Animal Behavior (5)
BIO 3453 Biodiversity: Plant Identification and Taxonomy (5)
BIO 3456 Biodiversity: Protista (5)
BIO 4117 Birds of the Pacific Northwest (3)
BIO 4435 Biodiversity: Parasites and Pests (5)
BIO 4735 Marine Biology (5)
BIO 4740 Marine Invertebrate Zoology (5)
BIO 4744 Marine Botany (5)
Ecology and Evolution
BIO 3310 Ecology (5)
BIO 4330 Evolutionary Mechanisms (3)
BIO 4810 Marine Ecology (5)
BIO 4815 Aquatic Ecology (5)
BIO 4820 Ecomorphology (5)
BIO 4825 Forest Ecology (5)
BIO 4950 Special Studies in Biology (3)
Total
34–38

Note: Some of the courses in elective categories have prerequisites in chemistry.



Biology Courses

Note: Courses whose course titles are followed by ▲ are held at Blakely Island Field Station.

BIO 1100 Biological Science (5) Intended for non-biology majors. Emphasis varies quarterly: Human Nutrition, Human Biology, Human Genetics, Environmental Biology, Biological Diversity, Marine Biology and others. Basic concepts include the chemistry of living things, their structure and function, and their interactions with the environment. Applications to current issues are considered from a Christian perspective. No credit will be given for students who have taken BIO 2101, 2102, 2103, 2129, 2130 or have Advanced Placement Biology credit. Also offered at Blakely Island Field Station and as a study tour. Attributes: Biological Sciences; and Natural Science A.

BIO 2101 General Biology (5) Prerequisites: One year of high school chemistry, CHM 1100 or equivalent. Intended for students majoring in biology. Surveys scientific method, chemistry of living organisms, organization of cells, and foundations of genetics and molecular biology. Includes laboratory. Attributes: Biological Sciences; and Natural Science A.

BIO 2102 General Biology (5) Prerequisite: BIO 2101 or permission of instructor. Intended for students majoring in biology. Surveys animal classification, structure, function, development and behavior. Includes laboratory. Attributes: Biological Sciences; and Natural Science A.

BIO 2103 General Biology (5) Prerequisite: BIO 2101 or permission of instructor. Intended for students majoring in biology. Surveys the non-animal kingdoms. Also covers plant structure and function, evolutionary mechanisms and ecology. Includes laboratory. Attributes: Biological Sciences; and Natural Science A.

BIO 2129 Human Anatomy and Physiology (5) Studies the structure and function of the human organism. Includes cells and tissues, skeletal, integumentary, muscular and nervous systems. Includes laboratory. Attributes: Biological Sciences; and Natural Science A.

BIO 2130 Human Anatomy and Physiology (5) Studies the structure and function of the human organism. Emphasizes the circulatory, immune, respiratory, digestive, endocrine, renal and reproductive systems. Includes laboratory. Attributes: Biological Sciences; and Natural Science A.

BIO 2600 Biotechnology Seminar (1) A seminar course for students interested in biotechnology as a career. Includes student presentations and speakers from local biotechnology companies.

BIO 3310 Ecology (5) Prerequisites: BIO 2103 and MAT 1360, or HSC 4044. Explores the factors and mechanisms responsible for population dynamics, community structure and the function of ecosystems. Includes laboratory. Attributes: Upper-Division; and Writing Course.

BIO 3320 Principles of Development (5) Prerequisites: BIO 2102 or equivalent. Surveys principles of developmental biology in vertebrates and representative invertebrate models. Required laboratory is devoted to experimental and descriptive approaches to the study of development. Attribute: Upper-Division.

BIO 3325 Genetics (5) Prerequisites: BIO 2101, and MAT 1360 or HSC 4044. Introduces inheritance of specific traits through the study of transmission genetics. Focuses on the biology of genes and chromosomes, including DNA replication, transcription and transla-

tion. Biotechnology and its applications are also presented. Biological statistics are emphasized throughout the course. Includes laboratory. Attribute: Upper-Division.

BIO 3350 Immunology (3) Prerequisites: BIO 2101, or BIO 2129 and 2130. Surveys specific and non-specific immune responses, the body's response to infection by viruses, bacteria and other foreign material, and current topics in immunological research. No laboratory. Offered alternate years. Attribute: Upper-Division.

BIO 3351 General Microbiology (5) Prerequisite: BIO 2101, or BIO 2129 and 2130. Explores the nature of microorganisms and their activities, the relationship of microbes to other living organisms, the biology of viruses, immunity and topics in microbiological research. Required laboratory focuses on culturing microbes and sterile technique. Attribute: Upper-Division.

BIO 3432 Biodiversity: Vertebrate Biology (5) Prerequisites: BIO 2102, 2103. Examines vertebrate life in an evolutionary context through the study of adaptations, comparative anatomy, paleontology and natural history. Includes laboratory. Offered alternate years. Attribute: Upper-Division.

BIO 3434 Animal Behavior (5) Prerequisites: BIO 2102, 2103. Examines the mechanisms and evolution of behavior in the major animal groups, exploring the application of scientific thinking and methodology to the study of animal behavior. Includes laboratory/discussion. Offered alternate years. Attributes: Upper-Division; and Writing Course.

BIO 3453 Biodiversity: Plant Identification and Taxonomy (5) Prerequisite: BIO 2103. Explores sampling, identification and systematics of the major plant families with special emphasis on the flora of the Pacific Northwest. Includes laboratory/field studies. Offered alternate years. Attribute: Upper-Division.

BIO 3456 Mycology (3) Prerequisite: BIO 2103. Considers the members of the Kingdom Fungi and some pseudofungal organisms. Emphasizes the taxonomy, identification, morphology, ultrastructure, ecology, environmental importance and commercial value of fungi. Attribute: Upper-Division.

BIO 4117 Birds of the Pacific Northwest (3) Prerequisite: BIO 2102. Study of birds common to the Puget Sound area and adjacent regions. Class activities include field observations, lectures, library research and laboratory study. Offered alternate years; includes field trips to Blakely campus and other locales. Extra fee. Attribute: Upper-Division.

BIO 4256 Environmental Physiology (5) Prerequisites: BIO 2102 and CHM 3372. Studies organisms in relation to the physical factors of the environment. Examines physiological and biochemical aspects of adaptation. Includes laboratory. Offered alternate years. Attributes: Upper-Division; and Writing Course.

BIO 4325 Molecular Biology (5) Registration approval: Instructor. Prerequisites: BIO 2101, 3325. Explores gene regulation and expression in several organisms including bacteria, viruses, yeast, plants and animals. Principles of molecular genetics and genetic engineering including gene mapping, DNA isolation and amplification, gene cloning, gel electrophoresis, PCR and sequencing. Advanced topics in molecular biological research will be presented. Includes intensive laboratory. Attributes: Upper-Division; and Writing Course.

BIO 4330 Evolutionary Mechanisms (3) Prerequisites: BIO 3310, 3325. Explores population genetics as a mechanism of evolutionary change, emphasizing mutation, recombination and selection. Considers speciation, quantitative genetics, neutral theory, phyloge-

netic systematics, history and extinction. Includes discussion of microevolutionary and macroevolutionary changes. No laboratory. Attributes: Upper-Division; and Writing Course. Class not open to non-matriculated students.

BIO 4352 Cell Biology (5) Prerequisites: BIO 3325 and CHM 3371. Examines structure and functions of bacteria, plants and animals, emphasizing cellular specialization, organelle models and chemical dynamics. Includes laboratory. Course equivalent: EGR 4352. Attributes: Upper-Division; and Writing Course.

BIO 4360 Biostatistics (5) Prerequisite: MAT 1360. Explores the nature and use of measurement and evaluation and standardized testing. Develops concepts and skills in the development, selection, administration and interpretation of statistical tests. Specific topics covered may include the following: Analysis of variance and covariance; chi square tests; nonparametric procedure multiple and curvilinear regression; experimental design power of tests; and use of computer programs in standard statistical problems. Attribute: Upper-Division.

BIO 4361 Biochemistry (5) Prerequisite: CHM 3373. (CHM 3226 and CHM 3403 are recommended.) Studies chemical properties of biological compounds: carbohydrates, lipids, amino acids and proteins and nucleic acids. Metabolism: biochemical energetics, enzymes, electron transport and oxidative phosphorylation. Integration of metabolism: biochemical genetics, metabolic regulation. Includes laboratory. Course equivalent: CHM 4361. Attribute: Upper-Division.

BIO 4362 Biochemistry (5) Prerequisite: BIO 4361. Continuation of BIO 4361. Studies chemical properties of biological compounds: carbohydrates, lipids, amino acids, proteins and nucleic acids. Metabolism: biochemical energetics, enzymes, electron transport and oxidative phosphorylation. Integration of metabolism: biochemical genetics, metabolic regulation. Includes laboratory. Course equivalent: CHM 4362. Attribute: Upper-Division.

BIO 4363 Biochemistry (3) Prerequisite: BIO 4362 or permission of instructor. Explores selected topics including immunoglobulins and the immune system; bacterial cell walls; membrane transport; hormone action; control of expression; genetic code; muscle contraction; cell physiology; drug action; protein folding; HIV mechanisms; and mechanisms of infectious disease. Seminar format with leading researchers presenting current work. No laboratory. Course equivalent: CHM 4363. Attribute: Upper-Division.

BIO 4413 Animal Physiology (5) Prerequisites: BIO 2102 and CHM 3372. Investigates physiology of higher animals, emphasizing endocrine and neuro-coordinating systems, cardiovascular, muscular, renal and reproductive physiology of higher vertebrate organisms. Includes laboratory. Attributes: Upper-Division; and Writing Course.

BIO 4415 Plant Physiology (5) Prerequisites: BIO 2103, CHM 3371. Considers photosynthesis, material transport, seed germination, growth and development, flowering and fruiting, and hormones of plants. The relationship of structure and function will be emphasized. Includes laboratory. Attributes: Upper-Division; and Writing Course.

BIO 4418 Neurobiology (5) Prerequisites: BIO 2102 or 2129 and CHM 3372. An introduction to the neurosciences, focusing on fundamental concepts and comparative aspects of nervous-system structure and function. Laboratory makes extensive use of invertebrate models to examine the cellular basis of behavior, including neuronal morphology, electrophysiology and transmitter chemistry. Includes laboratory. Offered alternate years. Attribute: Upper-Division.

BIO 4420 Histology and Microscopic Technology (5) Prerequisites: BIO 2102, CHM 3372. BIO 4352 recommended. Examines microscopic anatomy of cells, tissues and organ/systems, examining their structure and the morphological evidences of their function. Emphasizes human histology. Includes laboratory. Offered alternate years. Attribute: Upper-Division.

BIO 4435 Biodiversity: Parasites and Pests (5) Prerequisite: BIO 2102. Explores the biology and classification of medically and economically important organisms, with emphasis on protozoa, parasitic worms, insects and mites. Provides a survey of parasitic disease, vector biology, and animal pests of livestock and crops. Includes laboratory. Offered alternate years. Attribute: Upper-Division.

BIO 4615 Issues and Values in Biology (3) Examines ethical aspects of current issues in biology that help shape a Christian worldview and value system. Attributes: Upper-Division; and Writing Course. Class not open to freshmen and sophomores.

BIO 4735 Marine Biology (5) ▲ Prerequisites: BIO 2102, 2103. Study of the marine environment and the identification, unique features and natural history of the organisms inhabiting it. Extra fee. Attribute: Upper-Division.

BIO 4740 Marine Invertebrate Zoology (5) ▲ Prerequisite: BIO 2102. Provides a field and laboratory course emphasizing identification, life histories, habitats and interrelationships of Pacific Northwest marine invertebrates. Includes laboratory. Normally taught Summer Quarter at Blakely Island. Extra fee. Attribute: Upper-Division.

BIO 4744 Marine Botany (5) ▲ Prerequisite: BIO 2103. Provides a field and laboratory course emphasizing identification, life histories, habitats and interrelationships of marine plants with emphasis on local flora and Blakely Island. Includes laboratory. Normally taught in summer at Blakely Island Field Station. Extra fee. Attribute: Upper-Division.

BIO 4810 Marine Ecology (1–5) ▲ Prerequisites: BIO 2102, 2103. Considers recent advances in marine ecology. Symbioses, predation, herbivory and interactions with the physical environment will be emphasized. Laboratory and field work will include the application of ecological techniques to a specific problem and will include the writing of reports describing the results. Offered during the Summer Quarter at Blakely Island Field Station. Extra fee. Attributes: Upper-Division; and Writing Course.

BIO 4815 Aquatic Ecology (5) ▲ Prerequisite: BIO 2102. Introduces students to the biology of freshwater organisms. The physical, chemical and biological characteristics of flowing and standing water habitats will be studied. The field and laboratory work will focus on lakes, streams and marshes. Offered Summer Quarter at Blakely Island Field Station. Extra fee. Attribute: Upper-Division.

BIO 4820 Ecomorphology (5) ▲ Prerequisite: BIO 2102. Provides an introduction to the study of ecological morphology. Relationships between the environment and the structure, functional design and behavior of organisms are examined through a combination of lectures, laboratory work and field observations. Offered Summer Quarter at Blakely Island Field Station. Extra Fee. Attribute: Upper-Division.

BIO 4825 Forest Ecology (5) ▲ Prerequisite: BIO 2103. Examines the organisms that comprise the forest ecosystem and their interaction with the physical environment. Emphasis will be placed on field study of forest community composition, and the forest as a biologically modified habitat. Normally offered Summer Quarter at Blakely Island Field Station. Extra fee. Attribute: Upper-Division.

BIO 4830 Ecological Restoration Workshop (2)▲ A workshop providing practical experience in restoring damaged forest or wetland sites on Blakely Island, combined with readings and discussions of technical, social and spiritual issues related to the emerging interdisciplinary area of ecological restoration. Normally offered Summer Quarter at Blakely Island Field Station. Extra Fee. Attribute: Upper-Division.

BIO 4835 Conservation Biology (5)▲ Prerequisite: BIO 2103 or equivalent. Considers values of, threats to, and strategies for conserving biodiversity. Theories of conservation biology will be applied to local biodiversity on Blakely Island. Field exercises will focus on assessing biodiversity of distinct taxa and honing skills for identifying the diversity of plants and animals near the field station. Extra fee. Attribute: Upper-Division.

BIO 4880 Blakely Field Studies (1–5)▲ Provides a brief (e.g., weekend) field-learning experience focusing on a single aspect of the Blakely Island environment such as fresh water, marine or terrestrial habitats. Offered at Blakely Island Field Station. Extra fee. May be repeated for credit up to 5 credits. Attribute: Upper-Division.

BIO 4899 Natural Sciences Seminar (1) A capstone experience for seniors that explores current natural sciences topics in an interdisciplinary setting. Seminars addressing current research advances, ethical issues in science or the intersection of science, vocation and Christian faith are presented by faculty, students and guest scholars. Discussion and reflection incorporate appropriate readings. A minimum of two quarters of seminar must be completed during the senior year to fulfill the senior capstone requirement. May be repeated for credit up to 3 credits. Course equivalents: CHM 4899 and PHY 4899. Attribute: Upper-Division. Class open to seniors.

BIO 4900 Independent Study in Biology (1–5) Registration approval: Independent Study Agreement. Directed readings and/or investigation on special topics. May be repeated for credit up to 5 credits. Attribute: Upper-Division.

BIO 4917 Latin American Studies Program: Science Seminar (6) Registration approval: Travel Studies Form. Prerequisite: Acceptance into Latin American Studies Program. Taught through the semester-long program of the Council for Christian Colleges and Universities in Costa Rica. This seminar introduces students to biological field studies in a tropical location. May be taken as an alternative to SBS 4919, but is not recommended for the LAS major. Part of the tropicals science track. Attribute: Upper-Division. Class not open to freshmen and non-matriculated students.

BIO 4918 Latin American Studies Program: Field Research (3) Registration approval: Travel Studies Form. Prerequisite: Acceptance into the Latin American Studies Program. Taught through semester-long program of the Council for Christian Colleges and Universities in Costa Rica. Part of the tropical science track. Attribute: Upper-Division.

BIO 4930 Biology Practicum (1–5) Registration approval: Instructor. Provides opportunity for applied biology. Selected students are assigned teaching, grading, lab preparation and/or tutoring responsibilities. May be repeated for credit up to 5 credits. Attribute: Upper-Division.

BIO 4940 Internship in Biology (1–5) Registration approval: Intern Learning Contract Req. Provides a significant learning experience under faculty supervision in a work-study environment either on or off campus. May be repeated for credit up to 5 credits. Attribute: Upper-Division.

BIO 4950 Special Studies in Biology (1–5) Registration approval: Travel Studies Form. Provides selected field study topics offered at Biology Department's discretion: Hawaiian marine biology; Caribbean marine biology (e.g., Belize); Galapago Islands natural history; Sonoran Desert biology; Alpine flora and others. May be repeated for credit up to 6 credits. Attribute: Upper-Division.

BIO 4978 Biological Research Proposal (1) Registration approval: Instructor. The student will prepare a proposal including a literature review and methods description for a biological research project. Attributes: Upper-Division; and Writing Course.

BIO 4979 Biological Research (1–4) Registration approval: Instructor. Prerequisite: BIO 4978. The student will conduct research based on a proposal prepared prior to registering for this course. Results of the research will be presented at undergraduate or professional symposia. May be repeated for credit up to 4 credits. Attribute: Upper-Division.

Faculty

Cynthia R. Bishop, Assistant Professor of Biology; B.S., Seattle Pacific University, 1980; D.V.M., Washington State University, 1984. At SPU since 2000.

Bruce D. Congdon, Dean of the College of Arts and Sciences, Professor of Biology; B.S., College of the Ozarks, 1979; M.S., Colorado State University, 1981; Ph.D., University of California, Riverside, 1985. At SPU since 1985.

Cynthia L. Fitch, Associate Professor of Biology; Coordinator, Pre-Professional Health Sciences Program; B.S., McMurry College, 1985; Ph.D., Iowa State University, 1990; Post-doctoral Fellow Howard Hughes Medical Institute, University of Washington, 1990–93; Research Scientist, University of Washington Medical School, 1993–94. At SPU since 1994.

A. Kenneth Moore, Professor of Biology; B.A., Evangel College, 1960; M.A., University of Missouri, 1963; Ph.D., University of New Mexico, 1975. At SPU since 1975.

Timothy A. Nelson, Associate Professor of Biology; Director of Blakely Island Program; B.S., Seattle Pacific University, 1987; Ph.D., University of Washington, 1995. At SPU since 1991.

Richard L. Ridgway, Associate Professor of Biology; Chair of Biology; B.S., Seattle Pacific University, 1977; M.S., Washington State University, 1983; Ph.D., 1988. Post-Doctoral Fellow, Alberta Heritage Foundation for Medical Research, University of Calgary, Canada, 1988–91. Post-Doctoral Fellow, Canadian Centres of Excellence in Neural Regeneration and Functional Recovery, 1990–91. At SPU 1978–80 and since 1991.

Biotechnology

Science Building
Voice Mail: (206) 281-2351

Bruce D. Congdon, *Dean of the College of Arts and Sciences*

Richard L. Ridgway, Director, **Cynthia L. Fitch**,
Benjamin J. McFarland

Biotechnology has been identified as one of the most important applied sciences of the 21st century. This emergent field embraces many disciplines, including biochemistry, molecular biology, genetics, cell biology and computer science/mathematical modeling. It has been argued that this synergy will lead to a new discipline where technology and biology are driving each other. Dramatic examples of this are the Human Genome Project and recent advances in genetic manipulation for medical therapy, which may eventually lead to extended and expansive practice of what

is termed preventative medicine (i.e., identification of genes predisposing to disease and the use of therapies to avoid or lessen disease).

The Seattle area is one of the leaders in biotechnology, with over 100 biotechnology firms in operation. This industry exerts a major economic force and provides a rapidly growing employment opportunity for research and administrative positions. The influence of this biotechnology industry is felt in educational institutions, including science-education enhancement in the K-12 classrooms, as well as for college and university students who find many opportunities for undergraduate research projects.

To maximize benefits for students at SPU, a biotechnology program was launched in 1997–98. More recently, through participation in the Washington State Biotechnology and Biomedical Skill Standards Project (1999–2002), the program revised its curriculum to focus on student mastery of critical work functions identified by biotechnology industry representatives. As a result of this revision, a dedicated degree pathway (B.S. Biology, Option III) with emphasis in biotechnology/molecular biology was created and a special “two-way” articulation agreement was established between the biotechnology programs at Shoreline Community College (SCC) and SPU. This articulation enables associate of applied arts and sciences (A.A.S. degree) graduates of Shoreline Community College to transition smoothly to the B.S. Biology (Option III) pathway at SPU, while SPU biotechnology program students gain easy access to several vocationally oriented courses at SCC.

The Biotechnology Program uses existing courses in biology and chemistry, but with some special emphases (see B.S. Biology, Option III, under Biology) In addition to regular coursework and exams, biotechnology program students demonstrate their proficiency through (1) maintenance of industry-standard laboratory notebooks; (2) compilation of a Biotechnology Laboratory Skills Portfolio to document their skill competency for external reviewers, such as during job interviews; (3) involvement in an educational outreach experience focusing on biotechnology issues; and (4) successful completion of a one- or two-term internship experience in a biotechnology laboratory setting, which may be extended to a senior thesis project. For more information regarding the biotechnology program contact Dr. Richard L. Ridgway, Department of Biology.

Blakely Island Field Station

Blakely Island, Washington
(206) 281-3640
www.spu.edu/blakely

Bruce D. Congdon, *Dean of the College of Arts and Sciences*

Timothy Nelson, *Director, Department of Biology*

In 1977, the University was given 900 acres of land and granted an open-space conservation easement on another 3,000 acres on Blakely Island, in the San Juan archipelago of Northwestern Washington. The Blakely Island Field Station serves as the teaching site for upper-division biology courses in marine, aquatic and terrestrial ecology, as well as in natural history, introductory biology and astronomy for non-science majors. Research conducted by faculty and students has included baseline surveys of major island habitats and the ecology of lakes, marine bays and forests. The field station campus is located near Spencer Lake, one of the island's two freshwater lakes.

Although only a few miles from the mainland, the island is isolated and home to only a few year-round residents. Facilities include a dining hall-library-classroom building that accommodates 24 students and staff, a residence hall with 10 double-occupancy

rooms and a dive shop. The island is surrounded by lush kelp forests, eelgrass meadows and spectacular rock walls. These subtidal and intertidal habitats support a diversity of seaweeds, invertebrates, fish and marine mammals. In the island interior, the lakes provide habitat for river otters, herons, kingfishers, bald eagles and ospreys, as well as a diverse invertebrate fauna. The terrain is rugged, rising sharply from sea level to more than 1,000 feet, and it supports several distinctive forest types. For more information, contact the field station director.

For a complete listing of biology courses offered at Blakely Island Field Station visit the Web site listed above; for other courses contact, Dr. Timothy Nelson, director of the field station.

Business and Economics, School of

David L. McKenna Hall
(206) 281-2970
www.spu.edu/depts/sbe

Jeffrey Van Duzer, *Dean of the School of Business and Economics*

Don Attebury, Nancy Christie, Jonathan Deming, Denise Daniels, Douglas Downing, Al Erisman, Randal Franz, Dan Hess, Gary Karns, Herbert Kierulff, Kenneth Knight, Henry Petersen, Joanna Poznanska, James Rand, Regina Schlee, Richard Sleight, Gerhard Steinke, Ross Stewart, Lisa Surdyk, Kenman Wong

“We prepare students for service and leadership in business and society by developing their professional competence and integrity in the context of Christian faith and values. We are a learning community that prizes educational excellence and effective teaching, supported by scholarship and service.”

— *School of Business and Economics Mission Statement*

SBE Distinctives

While the programs of the School of Business and Economic (SBE) are appropriately similar to those offered by other universities in the coverage of the basic business knowledge and skills, at Seattle Pacific University, they reflect three mission-driven distinctives:

1. Christian faith, ethics and character
2. Applied learning
3. Collaborative learning community

Admission to Majors in the School of Business and Economics

Majors offered by the School of Business and Economics are accounting, business administration and economics. The business administration major offers concentrations in the following areas: (1) economics; (2) finance; (3) information systems; (4) international business; (5) management; and (6) marketing.

Students who are interested in a business major are encouraged to indicate their interest upon arrival at SPU. This indication is made with the Office of Admissions. It does not commit the student to a major within the school, but assures that an advisor from within the school will be assigned and information about the school and its various activities will be received.

For matriculated students, formal application and admission to a major is required prior to enrollment in certain upper-division business or economics courses. Admission is selective and based upon prior academic performance. Admission applications should be submitted to the School of Business and Economics by the

application deadline of February 1 and after all admission requirements are satisfied. If you have been admitted to another SPU major, or are a new junior or senior transfer student, contact the SBE office for permission to enroll in upper-division courses. All course prerequisites must be completed before a student may enroll in an SBE course. To be awarded a degree from the School of Business and Economics, students must meet the major and any concentration requirements in effect at the time declaration of a major was made. They must have a minimum of 45 credit hours in the major at SPU.

Admission Requirements for Majors in Accounting, Business Administration and Economics

Consistent with its mission, the School of Business and Economics admits students to its majors on the basis of academic achievement, personal character, leadership potential and record of service. To meet the minimum requirements for admission to a major, the student must have attained at least sophomore standing; completed at least 15 credits (10 credits for junior or senior transfer students) in School of Business and Economics courses (ACCT, BUS, ECN); have demonstrated computer competency by passing BUS 1700, or by passing a competency exam covering the equivalent; and have achieved a minimum of 2.70 cumulative GPA from all institutions and a minimum of 2.70 cumulative GPA in all SBE courses. Students who enter SPU as freshman may apply for admission to the School of Business and Economics by February 1 of their sophomore year. Students who enter SPU as transfer students should apply for admission to the School of Business and Economics by February 1 of their first year. When applying by February 1, students will have a better chance of being admitted to certain classes and being considered for SBE scholarships. Newly admitted students will be welcomed to the SBE community at an orientation evening held in early spring, which will include information on the SBE mission and practical tips on succeeding in SBE majors. All newly admitted majors are required to attend this event. Attainment of the minimum GPA standards does not guarantee admission to a major as the total number of admissions may be limited by capacity. Application forms may be obtained online from the SBE home page at www.spu.edu/depts/sbe.

Admission Requirements for Minors in Business Administration and Economics

To be accepted to a minor in the School of Business and Economics, the student must have attained at least sophomore standing and have achieved a minimum 2.70 cumulative GPA from all institutions. Application forms may be obtained online from the SBE home page at www.spu.edu/depts/sbe.

Scholarship Program

The School of Business and Economics has, through the generous donations of corporations and individuals, several separate scholarships for School of Business and Economics majors. All students interested in these business scholarships should contact the School of Business and Economics. The application deadline for these scholarships is March 1.

Internships

Internships give students an opportunity to gain practical work experience and to apply their academic background in a professional business environment. (See BUS/ECN 4940.)

Interdisciplinary B.A. Program in Computer Science (Business Emphasis)

Students planning to major in computer science for the B.A. degree with a business application emphasis should see the Requirements for the Major in the Computer Science section of this *Catalog*.

Accounting

Ross E. Stewart, Contact Person
(206) 281-2900

Graduates with majors in accounting have careers in private industry, not-for-profit organizations and in public accounting. The program balances sound theoretical foundations with relevant applications. This provides the necessary current knowledge for the student to launch a career, and it also prepares the student to respond to the changing future environment and needs for accounting information. Students who successfully complete the program will be eligible to take both the certified public accountant (CPA) and the certified management accountant (CMA) examinations.

Requirements for the Major

104 credits

Refer to pages 60–62 for a summary of degree requirements.

Students desiring to major in accounting must follow the application process described above. To be awarded a degree with a major in accounting, students must meet the major requirements in effect at the time declaration of a major was made and have a minimum of 45 credit hours in the major at SPU. Students who plan to obtain any of the professional designations such as certified public accountant (CPA), certified management accountant (CMA) or certified internal auditor (CIA) should contact an accounting faculty member for advising. Students who plan to take the CPA exam must have completed 225 quarter hours (equivalent to five years) of college coursework. Students may meet this requirement by earning a second bachelor's degree, or by taking 45 additional undergraduate credits (which may be in any discipline and do not necessarily lead to a degree). However, CPA-bound students are encouraged to apply for admission to a graduate program in the School of Business and Economics, either the master of business administration (M.B.A.) or the master of science in information systems management (I.S.M.). Students interested in this program should do the following:

1. Participate in a cooperative education program with an accounting firm for at least one year.
2. Take the GMAT exam (for the M.B.A.) or the GRE exam (for the I.S.M.) in Autumn Quarter of their senior year.
3. Apply for admission to the graduate program in the Winter Quarter of their senior year.
4. Commence taking three graduate courses per quarter in the summer following completion of their senior year, and for four more quarters (five quarters in total).

General Core

Core requirements to be completed by first quarter sophomore year

ECN 2101 Principles of Microeconomics	5
ECN 2102 Principles of Macroeconomics	5
BUS 2414 Legal Environment of Business	5

Core requirements to be completed during the sophomore year

ACCT 2361 Financial	5
ACCT 2362 Managerial Accounting	5
BUS 3250 Business Finance	5
BUS 2600 Managerial Communication	2
BUS 2700 Statistics For Business and Economics	5

Six courses recommended to be completed in the junior and senior years in this order:

BUS 3614 Organizational Behavior	5
BUS 3541 Marketing and Society	5
BUS 3700 Quantitative Methods for Decision Making or BUS 3710 Optimization and Statistics	3
BUS 4644 Operations Management	5
BUS 4690 Strategic Management	5
BUS 4899 Business Ethics	5

BUS 4690 and 4899 are recommended to be taken during the last quarter of senior year.	
These requirements should be completed during the junior or senior year	
BUS 3620 Management Information Systems	5
Accounting Core Sequence to be taken junior year	
ACCT 3351 Intermediate Accounting I	5
ACCT 3352 Intermediate Accounting II	5
ACCT 3353 Intermediate Accounting III	5
Additional Accounting Core Courses	
ACCT 3327 Cost Accounting	5
ACCT 4362 Accounting Theory and Problems	5
ACCT 3324 Federal Income Taxation	3
ACCT 3328 Auditing	3
ACCT 4351 International Accounting	3
Total	104

Note: Demonstration of computer competency is required. This is documented by passing BUS 1700, or by passing a competency exam covering the equivalent.

Accounting Courses

ACCT 2361 Financial Accounting (5) Makes clear the ways in which accounting is an information development and communication function that supports economic decision making, and prepares students for subsequent learning. Not recommended for first-quarter freshmen.

ACCT 2362 Managerial Accounting (5) Registration approval: SBE coordinator. Prerequisites: ACCT 2361, BUS 1700 or competency exam. Develops basic concepts and skills for preparing accounting information for managerial decision-making purposes. Computer spreadsheet skills are required.

ACCT 3324 Federal Income Taxation (3) Registration approval: SBE coordinator. Prerequisite: ACCT 2361. Provides an introduction to the income tax structure and basic concepts of tax law relating to individual, corporate, partnership and estate income taxation. Attribute: Upper-Division. Class not open to freshmen.

ACCT 3325 Federal Income Tax II (5) Registration approval: SBE coordinator. This is a continuation of ACCT 3324. Attribute: Upper-Division. Class not open to freshmen.

ACCT 3327 Cost Accounting (5) Registration approval: SBE coordinator. Prerequisite: ACCT 2362. Introduces basic principles of cost accounting as applied to materials, labor and manufacturing overhead. Attribute: Upper-Division. Class not open to freshmen.

ACCT 3328 Auditing (3) Registration approval: SBE coordinator. Prerequisite: ACCT 3352. Teaches auditing theory and concepts to gather and evaluate evidence supporting an entity's financial statements. Attribute: Upper-Division. Class not open to freshmen and sophomores.

ACCT 3351 Intermediate Accounting I (5) Registration approval: SBE coordinator. Prerequisite: ACCT 2362. Studies the concepts and principles of accounting related to recognition, valuation and classification of economic events. Includes issues related to the measurement of income. Attribute: Upper-Division. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences and textiles, clothing and interiors majors. Class not open to freshmen.

ACCT 3352 Intermediate Accounting II (5) Registration approval: SBE coordinator. Prerequisite: ACCT 3351. Continuation of 3351. Attribute: Upper-Division. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences and textiles, clothing and interiors majors. Class not open to freshmen.

ACCT 3353 Intermediate Accounting III (5) Registration approval: SBE coordinator. Prerequisite: ACCT 3352. Continuation of 3352. Attribute: Upper-Division. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences and textiles, clothing and interiors majors. Class not open to freshmen.

ACCT 4351 International Accounting (3) Registration approval: SBE coordinator. Prerequisite: ACCT 3353. Considers and analyzes financial accounting concepts relating to consolidated financial statements, translation of foreign financial statements and accounting for foreign transactions, international financial reporting and accounting for special entities. Recommended for CPA examination preparation. Attribute: Upper-Division. Class not open to freshmen and sophomores.

ACCT 4362 Accounting Theory and Problems (5) Registration approval: SBE coordinator. Prerequisite: ACCT 3353. Critically examines problem areas of current interest in financial accounting. Emphasizes investigating the "why's" behind today's generally accepted accounting principles and explores alternative approaches to the study and development of accounting theory. Several problems or contentious theoretical issues facing the accounting profession are examined in depth with the objective of having the student form a well-reasoned position on the matter. Attributes: Upper-Division; and Writing Course. Class not open to freshmen and sophomores.

ACCT 4900 Independent Study — Accounting (1–5) Registration approval: Independent Study Agreement. The student proposes a topic of current interest in business to a professor in the School of Business and Economics. The student meets with the professor to discuss a bibliography and rough drafts before turning in the final draft of a paper. In general, the number of pages of written work must be six times the number of credits, or there must be equivalent work in exams or other requirements. May be repeated for credit up to 5 credits. Attribute: Upper-Division.

ACCT 4940 Internship (1–5) Registration approval: Intern Learning Contract Req. Provides field experience opportunities for students to relate and apply principles of business, faith, service and leadership to a professional business setting. Course consists of an internship in a professional business setting (minimum 10 hours/week) and an on-campus seminar. Internship placements must be approved prior to the internship experience or permission will not be granted to register for ACCT 4940 credit. Additional information may be obtained from the Career Development Center or internship coordinator for the School of Business and Economics. A student's initial internship must be taken for at least 2 credits. Course equivalents: BUS 4940 and ECN 4940. Attribute: Upper-Division. Class not open to freshmen and sophomores.

ACCT 4941 Advanced Integrative Internship (1–5) Registration approval: Intern Learning Contract Req. Prerequisite: ACCT 4940. Provides students the opportunity to specialize their applied learning to accounting issues and questions through individualized guidance with an accounting faculty sponsor; firsthand experience in their internship sites; academic research; and face-to-face interviews with professionals in the field. May be repeated for credit up to 6 credits. Course equivalents: BUS 4941 and ECN 4941. Attribute: Upper-Division. Class not open to freshmen and sophomores.

Business Administration

Douglas A. Downing, Contact Person
(206) 281-2890

The business administration major provides a broad-based education in the fundamental theories, principles and practices of modern business. The program develops a general management outlook toward organizations and the changing environment they face. It teaches standards of professional and ethical behavior along with the technical expertise and leadership attributes necessary to attain entry-level positions in business. Students who major in business administration are expected to master a core of courses in business and economics, and may choose from a concentration selected from one of the following areas: e-commerce, economics, finance, information systems, international business, management and marketing. All Students will take the following common core of classes described below under General Core.

Requirements for the Major

95 credits

Refer to pages 60–62 for a summary of degree requirements.

Students desiring to major in business administration must follow the application process described above. To be awarded a degree with a major in business administration, students must meet the general core requirements and at least 18 credits of upper-division elective courses within the School of Business and Economics. Students can choose to pursue a concentration in a specific business discipline by completing 15 of their 18 elective credits within that particular discipline. Major requirements are based on those in effect at the time declaration of the major was made. Also, a minimum of 45 credit hours in the major must be completed at SPU.

General Core

Demonstration of computer competency is required. This is documented by passing BUS 1700 or by passing a competency exam covering the equivalent. Demonstration of writing competency is required. After their written work in lower-division SBE courses is evaluated, students may be required to take an additional writing course from the English Department or secure other assistance with writing skills as directed by SBE.

General Core

To be completed by first quarter of sophomore year

ECN 2101 Principles of Microeconomics	5
ECN 2102 Principles of Macroeconomics	5
BUS 2414 Legal Environment of Business	5

To be completed during the sophomore year

ACCT 2361 Financial Accounting	5
ACCT 2362 Managerial Accounting	5
BUS 3250 Business Finance	5
BUS 2600 Managerial Communication	2
BUS 2700 Statistics for Business and Economics	5

These six courses are recommended to be completed during the junior and senior years in the order below:

BUS 3614 Organizational Behavior	5
BUS 3541 Marketing and Society	5
BUS 3700 Quantitative Methods for Decision Making or BUS 3710 Optimization and Statistics	3
BUS 4644 Operations Management	5
BUS 4690 Strategic Management*	5
BUS 4899 Business Ethics*	5

These four requirements may be completed during the junior or senior year:

BUS 3620 Management Information Systems	5
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BUS 3828 International Business	5
BUS 4940 Internship	2
Total general core	77

*BUS 4690 and 4899 are recommended to be taken during the last quarter of senior year.

Business Administration Major

General Core	77
Upper-division SBE electives*	18
Total for business administration major	95

*A minimum of 15 of these credits must be in BUS or ECN courses; a maximum of 3 credits may be taken in ACCT courses.

Concentration Options

Students wishing to pursue a disciplinary concentration must take 15 of their 18 upper-division elective credits from courses in that discipline as follows:

Concentration Options

Economics Concentration 15

ECN 3101 Intermediate Macroeconomics (5)	
ECN 3102 Managerial Economics (5)	

The remaining 10 credits must be selected from among any of the 3000- or 4000-level economics courses. (10)

Finance Concentration 15

BUS 3251 Investments (5)	
BUS 4274 Problems in Corporate Finance (5)	
BUS 4275 Practice of Finance (5)	

Information Systems Concentration 15

Students must choose 15 credits from among the following:

BUS 4620 Computer Networks (5)	
BUS 4622 Information and Database Systems (5)	
BUS 4625 The Organization's Presence on the Net (5)	
CSC 1230 Problem Solving and Programming (5)	

International Business Concentration 15

All chosen courses in this concentration must be approved by the SBE Undergraduate Committee.

BUS 3830 International Business Seminar (variable credits) or SBS 4911 Latin American Studies: Business Seminar	5
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The following course can be counted toward this concentration.

BUS 3548 International Marketing (5)	
BUS 4661 Special Topics in Management (1–3)	
ACCT 4351 International Accounting (3)	
ECN 4310 International Political Economy (5)	
THEO 3610 Living in Another Culture (3)	

Participation in SPU Business Study Abroad program, or the business program in the Latin American Studies program or another SBE-approval study-abroad program.*

Foreign language credits beyond SPU competency requirement.** (15 minimum)

Management Concentration 15

Students must choose 15 credits from among the following:

BUS 3439 Motivation and Leadership (5)	
BUS 3631 Entrepreneurship (5)	
BUS 3657 Human Resource Management (5)	
BUS 3670 Management in the Non Profit Sector (3)	
BUS 4645 Small Business Consulting (5)	
BUS 4660 Managing Systems (5)	
BUS 4661 Special Topics in Management (1–3)	

Marketing Concentration 15

BUS 3542 Marketing Research (5)	
BUS 4543 Marketing Management (5)	

The remaining five credits should be selected from among the following options:

BUS 3544 Advertising (5)	
BUS 4542 Consumer Behavior (5)	
BUS 3548 International Marketing (5)	
BUS 3545 Sales and Sales Management (5)	

*Some coursework will normally be taken as part of the study-abroad program.

***The foreign language requirement can be met by 15 credits in SPU foreign-language courses numbered 2000 or above, or by demonstrated fluency in a language other than English.*

Requirements for the Minor in Business Administration

The School of Business and Economics offers a business minor for students who want to complement their major with general business coursework. Formal declaration of a minor is required. Acceptance is based upon an application to the School of Business and Economics with a minimum cumulative grade point average of at least 2.70 in a minimum of 45 quarter credits of coursework. SPU requires students to earn at least 15 credits of the minor at SPU, 10 credits of which must be upper-division credits. Application to the minor may be made online at www.spu.edu/depts/sbe.

Requirements for Minor in Business Administration	
ECN 1100 or ECN 2101 or ECN 2102	5
ACCT 2361 Financial Accounting	5
BUS 3400 Business Ethics	5
Choose two of these three:	
BUS 3250 Finance (5)	
BUS 3541 Marketing and Society (5)	
BUS 3614 Organizational Behavior (5)	10
Choose one other course from ACCT, BUS or ECN	5
Total	30

Business Courses

BUS 1100 Introduction to Financial Management (3) Registration approval: Instructor. Studies the key areas of financial management in the firm. These include financial markets, internal and external sources of funds, working-capital management, capital budgeting, valuation and financial forecasting. Class open to non-matriculated students.

BUS 1700 Spreadsheets (1) What is a spreadsheet? Creating, modifying, saving and printing spreadsheet documents. Entering and using formulas and calculations. Editing and importing data. Incorporating graphs. Formatting and enhancing the appearance of a spreadsheet document. Course equivalent: CSC 1123.

BUS 2414 Legal Environment of Business (5) Studies the relationship between law and business. Includes coverage of laws that impact the employer-employee relationship, product safety, advertising, contracts, business organizations, and business crimes and torts.

BUS 2600 Managerial Communication (2) Prepares students for communicating effectively in organizations. Topics include writing concisely and clearly; writing effective reports and business correspondence, including email and memos; delivering oral presentations; and mastering presentation software.

BUS 2700 Statistics for Business and Economics (5) Registration approval: SBE coordinator. Prerequisite: Bus 1700 or competency exam. Explores descriptive statistics, probability, random variable distributions, estimation, hypothesis testing, regression and nonparametric statistics. Course equivalent: MAT 2700. Attributes: Quantitative Reasoning; and Mathematics.

BUS 2950 Special Topics in Spirituality and Business (1–5) This seminar-style course provides in-depth study of an issue related to Christian faith and business. The same topic cannot be taken for credit more than once. May be repeated for credit three times. Course equivalent: BUS 4950. Class open to freshmen.

BUS 3250 Business Finance (5) Registration approval: SBE coordinator. Prerequisite: ACCT 2361 and 2362. Studies the principles of financial markets, internal and external sources of funds and their costs to the firm. Includes management of working capital, capital budgeting, valuation issues and financial planning. Attribute: Upper-Division. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences and textiles, clothing and interiors majors. Class not open to freshmen.

BUS 3251 Investments (5) Registration approval: SBE coordinator. Prerequisite: BUS 3250. Studies the basic problems and issues concerning development and implementation of a personal investment program. Includes analysis of investment risks, types of investments, securities markets and portfolio theory. Also considers securities analysis and valuation techniques. Attribute: Upper-Division. Class open to accounting, business administration and economics majors. Class not open to freshmen.

BUS 3414 Business Law (5) Studies the uniform commercial code, sales, negotiable instruments, secured transactions, estates and trusts, security, bankruptcy and insurance. Intended primarily for accounting majors. Recommended for CPA examination preparation. Attribute: Upper-Division. Class not open to freshmen.

BUS 3439 Motivation and Leadership (5) Registration approval: SBE coordinator. Prerequisite: BUS 3614 or PSY 1180. Presents the theories and principles of motivation and leadership with practical application in business, church, community and educational settings. Course equivalent: PSY 3439. Attribute: Upper-Division. Class not open to organizational behavior and psychology majors.

BUS 3541 Marketing and Society (5) Studies the principles of marketing, employs a systems approach to examine the impact of marketing on the quality of life. Considers both macro and micro dimensions of marketing. Attributes: Upper-Division; and Writing Course. Class not open to freshmen.

BUS 3542 Marketing Research (5) Registration approval: SBE coordinator. Prerequisites: BUS 2700, 3541. Studies the marketing research process: preliminary steps and research design, questionnaires, secondary and primary data, sampling, processing and interpreting data, evaluation and effective presentation of findings. Attribute: Upper-Division. Class open to accounting, business administration and economics majors. Class not open to freshmen.

BUS 3544 Advertising (5) Registration approval: SBE coordinator. Prerequisite: BUS 3541. Describes the theory and practice of advertising and its role in the firm and in the socio-economic system. Discusses techniques and the management of advertising and applies them to the practice of marketing. Attribute: Upper-Division. Class not open to freshmen.

BUS 3545 Sales and Sales Management (5) Registration approval: SBE coordinator. Prerequisites: BUS 3541, 3614. Sales planning and organization. Management of the sales force for productivity. Personal selling techniques. Attribute: Upper-Division. Class open to accounting, business administration and economics majors. Class not open to freshmen.

BUS 3548 International Marketing (5) This course examines the theory and application of international marketing from a global, rather than a U.S.-centered viewpoint. International management issues are examined both from the perspective of small and mid-sized businesses, as well as multinational firms. The course also focuses on ethical issues concerning the global diversity of customs and morals, environmental issues and the impact of trade. This course is offered online. Attribute: Upper-Division. Class not open to freshmen and sophomores.

BUS 3614 Organizational Behavior for Managers (5) An introduction to theory, research and practice related to the management of human behavior in an organizational context. Course topics include individual characteristics, motivation, learning, communication, leadership, decision making, group dynamics, conflict, power and politics. The course involves significant group activities and requires multiple oral presentations. Attribute: Upper-Division. Class open to accounting, business administration, computer science and economics majors. Class not open to freshmen.

BUS 3620 Management Information Systems (5) Studies the processes for collecting, verifying and processing information to assist management in making decisions to achieve the organization's goals. Software, hardware, networks and electronic data interchange will be examined, with computer systems viewed as one part of the complete information system. Attribute: Upper-Division. Class not open to freshmen.

BUS 3631 Entrepreneurship (5) Registration approval: SBE coordinator. Prerequisite: ACCT 2361. Studies the major elements of innovation and new enterprise formation and growth. Examines in-depth through lectures, guest speakers, videos and class exercises the characteristics of the entrepreneurial personality and the nature of the entrepreneurial task. Special emphasis is placed upon leadership, venture planning, time management and the transfer of technology from concept to commercialization. Attribute: Upper-Division. Class open to accounting, business administration and economics majors. Class not open to freshmen.

BUS 3657 Human Resource Management (5) An introduction to the management of human resources in organizations. Theory, research and practice in the areas of human resources planning, job analysis and design, recruiting and staffing, training and development, performance appraisal, compensation, organization development, government regulation of HRM and quality of work life will be studied. Attribute: Upper-Division. Class open to accounting, business administration, economics, family and consumer sciences, food and nutritional sciences and textiles, clothing and interiors majors. Class not open to freshmen.

BUS 3670 Management in the Nonprofit Sector (3) Focuses on the management of not-for-profit organizations. Includes analysis of board of directors, management responsibilities, funding requirements, coordination and direction of volunteers, legal issues and public relations. Appropriate for those interested in the management of churches, hospitals, performing groups, social service organizations. Attribute: Upper-Division. Class open to accounting, business administration and economics majors. Class not open to freshmen.

BUS 3700 Quantitative Methods for Decision Making (3) Registration approval: SBE coordinator. Prerequisite: BUS 2700. Uses computers for solving quantitative management decision problems. Includes optimization with derivatives; marginal analysis; linear programming; and forecasting methods. Course equivalent: BUS 3710. Attribute: Upper-Division. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences and textiles, clothing and interiors majors.

BUS 3710 Optimization and Statistics (3) Registration approval: SBE coordinator. Prerequisites: BUS 2700 and MAT 1221 or other previous study of calculus in high school or college. Use computers for solving quantitative management decision problems. Includes multivariable optimization, Lagrange multipliers, linear programming and forecasting methods. Course equivalent: BUS 3700. Attribute: Upper-Division. Class open to accounting, business

administration, computer science, economics, family and consumer sciences, food and nutritional sciences and textiles, clothing and interiors majors.

BUS 3828 International Business (5) Covers the major forms of international business including problems of licensing, production, marketing, import and export; emphasizes relationships between theory and practice regarding management, government policy and international problems. Attribute: Upper-Division. Class not open to freshmen.

BUS 3830 International Business Seminar (1–5) Registration approval: Instructor. This course will be taught by an SPU faculty member at a location outside the United States for students who are part of the School of Business and Economics study abroad program. The course will cover current topics in international business; the specific topics will vary from year to year. Attribute: Upper-Division. Class open to undergraduate students. Class not open to freshmen and sophomores.

BUS 4273 Special Topics in Finance (3) Registration approval: SBE coordinator. Prerequisites: BUS 3250; junior standing. Presents lectures and case studies dealing with cash flow, cash budgets, financial forecasting and establishing and maintaining relationships with financial sources. Also considers capital budgeting, leasing and specialized funding vehicles. Attribute: Upper-Division. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences and textiles, clothing and interiors majors. Class not open to freshmen.

BUS 4274 Problems in Corporate Finance (5) Registration approval: SBE coordinator. Prerequisite: BUS 3250. Gives an in-depth treatment of the more critical aspects of financial decision making introduced in BUS 3250, utilizing lectures and case studies. Topics typically include mergers and acquisitions, forecasting and cash budgeting, valuation techniques and capital structure issues. Attribute: Upper-Division. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences and textiles, clothing and interiors majors. Class not open to freshmen.

BUS 4275 The Practice of Finance (5) Registration approval: SBE coordinator. Prerequisite: BUS 4274. Applies tools and concepts in all phases of finance to real situations through projects and case studies. Attribute: Upper-Division. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences and textiles, clothing and interiors majors. Class not open to freshmen.

BUS 4542 Consumer Behavior (5) Registration approval: SBE coordinator. Prerequisite: BUS 3541. Examines how consumers make choices about what, how and when they buy. Special emphasis will be placed on integrating cognitive, behavioral and ethical concepts in the study of consumer behavior, and the relationships of consumer behavior with marketing strategies. Attribute: Upper-Division. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences and textiles, clothing and interiors majors. Class not open to freshmen.

BUS 4543 Marketing Management (5) Registration approval: SBE coordinator. Prerequisite: BUS 4542. Deals in depth with the planning, executing and controlling of marketing strategies and tactics. Uses a computer simulation and a case format. Attribute: Upper-Division. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences and textiles, clothing and interiors majors. Class not open to freshmen.

BUS 4620 Computer Networks (5) Registration approval: SBE coordinator. Prerequisite: BUS 3620. The components, development and management of computer networks are studied. Topics include telecommunications, installation and configuration of computer systems, network operations and management, client/server network issues, distributed systems, business applications of networks and hands-on network installation. Attribute: Upper-Division. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences and textiles, clothing and interiors majors. Class not open to freshmen and sophomores.

BUS 4622 Information and Database Systems (5) Registration approval: SBE coordinator. Prerequisites: BUS 3620 and CSC 1130 or CSC 1230. Database concepts and management issues are explored from information modeling to the implementation and application of a database. Topics include information modeling, database design and manipulation, query languages, integrity, reliability, distributed database, database management, design and implementation of a database application. Attribute: Upper-Division. Class not open to freshmen.

BUS 4625 The Organization's Presence on the Net (5) Registration approval: SBE coordinator. Prerequisites: BUS 3620. This course provides a framework for an organization to evaluate, create and implement a successful net presence through the use of e-commerce tools. Information technology advances drive dramatic changes in every area of economic and personal life. Opportunities and challenges abound: fluid organizational structures, globalization, service 24 hours a day, 7 days a week, networked communities, and supplier-producer-customer partnerships. Attribute: Upper-Division. Class open to undergraduate students. Class not open to freshmen and sophomores.

BUS 4644 Operations Management (5) Registration approval: SBE coordinator. Analyzes theory and application of the systems approach to production management. Provides a focus on the decision-making process, the design and control of manpower, materials and machines in several production/service environments. Attribute: Upper-Division. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences and textiles, clothing and interiors majors. Class not open to freshmen and sophomores.

BUS 4645 Small Business Consulting (5) Registration approval: SBE coordinator. Prerequisites: BUS 3614, 3541 and 3250. The student will write a specialized business plan in consultation with a selected small-business executive. Attribute: Upper-Division. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences and textiles, clothing and interiors majors. Class not open to freshmen, sophomores and juniors.

BUS 4660 Managing Systems (5) Registration approval: SBE coordinator. Prerequisites: BUS 3614. This management course is a problem-focused look at organizational systems. Building upon a systems-theory model we will explore the macro-level issues and dynamics of whole organizations. Topics will include organization structure, technology, culture, context, power and politics, effectiveness, innovation, learning and change. This is an applications-oriented course, where our analysis of companies will be informed by theory and grounded in practice. The term will culminate in a comprehensive group project and presentation. Attribute: Upper-Division. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences and textiles, clothing and interiors majors. Class not open to freshmen and sophomores.

BUS 4661 Special Topics in Management (1–3) Registration approval: SBE coordinator. Prerequisite: BUS 3614. Students analyze current issues in improving the effectiveness of organizations. May be repeated for credit up to 6 credits. Attribute: Upper-Division. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences and textiles, clothing and interiors majors. Class not open to freshmen and sophomores.

BUS 4690 Strategic Management (5) Registration approval: SBE coordinator. Prerequisites: BUS 3250, 3541, 3614, 3700 and 4644. Explores strategy formulation and implementation processes and the measurement of performance designed to aid organizations to achieve the purpose and objectives of both small and large businesses. Attributes: Upper-Division; and Writing Course. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences and textiles, clothing and interiors majors. Class not open to freshmen, sophomores and juniors.

BUS 4899 Business Ethics (5) Prerequisites: UFDN 3100 or equivalent; ECN 2102 or 2102. This senior-level capstone course explores various ethical theories and their application to the practice of business. Gives particular emphasis to Christian ethics and focuses on individual ethical decision making. Attribute: Upper-Division. Class open to accounting, business administration, computer science and economics majors. Class open to seniors.

BUS 4900 Independent Study in Business (1–5) Registration approval: Independent Study Agreement. The student proposes a topic of current interest in business to a professor in the School of Business and Economics. The student meets with the professor to discuss a bibliography and rough drafts before turning in the final draft of a paper. A 5-credit independent study requires a total of 30 pages of written work. In general, the number of pages of written work must be six times the number of credits, or there must be equivalent work in exams or other requirements. May be repeated for credit up to 15 credits. Attribute: Upper-Division.

BUS 4930 Business and Economics Practicum (1–3) Registration approval: SBE coordinator. Selected students are assigned instructional support responsibilities. May be repeated for credit up to 5 credits. Attribute: Upper-Division. Class open to accounting, business administration and economics majors. Class not open to freshmen and sophomores.

BUS 4940 Internship (1–5) Registration approval: Intern Learning Contract Req. Provides field experience opportunities for students to relate and apply principles of business, faith, service and leadership to a professional business setting. Course consists of an internship in a professional business setting (minimum 10 hours per week) and an on-campus seminar. Internship placements must be approved prior to the internship experience or permission will not be granted to register for BUS 4940 credit. Additional information may be obtained from the Career Development Center or internship coordinator for the School of Business and Economics.

A student's initial internship must be taken for at least 2 credits. Course equivalents: ACCT 4940 and ECN 4940. Attribute: Upper-Division. Class not open to freshmen and sophomores.

BUS 4941 Advanced Integrative Internship (1–5) Registration approval: Intern Learning Contract Req. Prerequisite: BUS 4940. Provides students the opportunity to specialize their applied learning to discipline specific issues and questions through individualized guidance with a faculty sponsor in their concentration, first-hand experience in their internship sites, academic research and face-to-face interviews with professionals. May be applied to a business administration elective. May be repeated for credit up to 6 credits. Course equivalents: ACCT 4941 and ECN 4941. Attribute: Upper-Division. Class not open to freshmen and sophomores.

"To be successful in a truly global business, our students have to learn how to reason effectively and, above all, learn to understand the cultural diversity of the world."

Joanna Poznanska
International Business



BUS 4950 Special Topics in Spirituality and Business (1–5)

This seminar-style course provides in-depth study of an issue related to Christian faith and business. The same topic cannot be taken for credit more than once. May be repeated for credit up to 9 credits. Course equivalent: BUS 2950. Attribute: Upper-Division.

Economics

Douglas A. Downing, Contact Person
(206) 281-2890

Economics is the study of the allocation of scarce resources among competing uses. Many vital issues that affect human welfare are studied in economics at SPU, with emphasis on a Christian perspective on society's decisions about how to organize the production and distribution of goods and services. The economics major presents the study of economics as one of the social sciences. The program is structured to provide the widest latitude for the student to select elective courses that will develop the student's economic interests. (See Business Administration section for the economics concentration in the business administration major.)

Requirements for the Major

70 credits

Refer to pages 60–62 for a summary of degree requirements.

Students desiring to major in economics must follow the application process described above. To be awarded a degree with a major in economics, students must meet the major requirements in effect at the time declaration of a major was made and have a minimum of 45 credit hours in the major at SPU.

General Core

Core requirements to be completed by first quarter of sophomore year

BUS 2700 Statistics for Business and Economics	5
ECN 2101 Principles of Microeconomics	5
ECN 2102 Principles of Macroeconomics	5

Select one course from the following

GEO 1110 World Regional Geography (5)	
POL 1110 Introduction to Politics (5)	
POL 1120 American Government and Politics (5)	5

Core requirements to be completed during the sophomore year

ACCT 2361 Financial Accounting	5
BUS 2600 Managerial Communication	2

Core requirements to be completed during the junior or senior years

ECN 3101 Intermediate Macroeconomics	5
ECN 3102 Managerial Economics	5
ECN 4310 International Political Economy (5)	
or POL 3320 Political and Economic Development of Nations (5)	5
BUS 3700 Quantitative Methods for Decision Making (3)	
or BUS 3710 Optimization and Statistics (3)	3
ECN 4316 Issues in Political Economy	5
BUS 4899 Business Ethics	5

Economics electives (15 credits required)

Take at least two courses from the following list; students then may (with approval of advisor) select ECN 4900 or a course in finance or business to complete the 15 credits:

ECN 2207 Economic Geography (5)	
ECN 3231 Urban Economics (5)	
ECN 3318 Economics of the Public Sector (5)	
ECN 3321 Money and Banking (5)	
ECN 3635 Marxism: 20th Century Theory and Practice (3)	
ECN 3640 Growth of the American System (3)	
ECN 4641-4642 History of Economic Thought (3)	
GEO 3500 Geography of Natural Resources (5)	15

Total **70**

Note: Demonstration of computer competency is required. This is documented by passing BUS 1700, or passing a competency exam covering the equivalent.

For students who will seek employment immediately after graduation, an internship (ECN 4940) is recommended. Students who plan to attend graduate school in economics are encouraged to take these courses: MAT 1225 and MAT 1226 Calculus, MAT 1228 Series and Differential Equations, and BUS 3710 Optimization and Statistics. Students completing these four courses may count these as 5 credits of electives in the economics major, and they may waive the requirement for GEO1110, POL1110 or POL1120.

Requirements for the Minor in Economics

As a complement to majors such as political science, or for those preparing for law school, the minor in economics can be a valuable addition to the degree. These requirements also satisfy the requirements for a teaching endorsement in economics. The requirements for the minor in economics include a 20-credit core of ECN 2101, ECN 2102, BUS 3400 and either ECN 3101 or ECN 3102, followed by 10 elective credits in ECN or other approved coursework. Formal declaration of the minor is required. Acceptance is based upon an application to the School of Business and Economics with a minimum cumulative GPA of at least 2.70 in a minimum of 45 quarter credits of coursework. Application to the minor may also be made online at www.spu.edu/depts/sbe.

Economics Courses

ECN 1100 Fundamentals of Economics (5) Introduces the principles of economics for non-majors planning to take only one course in economics. Examines demand and supply, the price system, income distribution, determination of national income, employment and prices, economics of environmental issues and the public sector, international trade, economic growth, and capitalism and socialism. Attributes: Social Science Introductions; and Social Science B.

ECN 2101 Principles of Microeconomics (5) Provides a foundation course for business majors. Topics include supply and demand; markets and the price system; allocation of resources, income distribution, economic power and the public sector; international trade; and comparative economic systems. Attributes: Social Science Introductions; and Social Science B.

ECN 2102 Principles of Macroeconomics (5) Presents topics including elementary demand and supply, determination of national income, employment and prices, money and banking system, fiscal and monetary policy and economic welfare, economic growth and development and international finance. Attributes: Social Science Introductions; and Social Science B.

ECN 3101 Intermediate Macroeconomics (5) Registration approval: SBE coordinator. Prerequisites: ECN 2101, 2102. An analysis of aggregate income, employment and price level; classical and Keynesian perspectives, and recent contributions. Attributes: Upper-Division; and Writing Course. Class not open to freshmen.

ECN 3102 Managerial Economics (5) Registration approval: SBE coordinator. Prerequisites: ECN 2101, 2102; BUS 2700. Examines microeconomics at the intermediate level with particular application to operations of the firm. Emphasizes the application of theory to actual situations encountered in the management of firms and explores the use of economic theory for projections and forecasting. Attribute: Upper-Division. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences and textiles, clothing and interiors majors. Class not open to freshmen.

ECN 3231 Urban Economics (5) Registration approval: SBE coordinator. Prerequisite: ECN 1100 or 2101. Examines economic and social factors influencing urban growth and land use patterns, especially forces influencing the demand for urban-land and affecting intra-urban rent, real estate values and the housing market. Examines such factors as taxation, zoning and other land-use policies as they relate to the development of urban land. Offered alternate years. Attribute: Upper-Division. Class not open to freshmen.

ECN 3318 Economics of the Public Sector (5) Registration approval: SBE coordinator. Prerequisite: ECN 1100 or 2101. Presents the rationale for governmental provision of goods and services, non-market decision making, public expenditure analysis, taxation, fiscal policy and the role of the government in economic systems. Offered alternate years. Attribute: Upper-Division. Class not open to freshmen.

ECN 3321 Money and Banking (5) Registration approval: SBE coordinator. Prerequisites: ECN 2101 and 2102; ACCT 2361. Surveys monetary theory and the role of major financial institutions such as commercial banks, the Federal Reserve System and savings institutions in the monetary system. The impact of bank operations on the quantity and flow of money in the economic system is emphasized. Attribute: Upper-Division. Class not open to freshmen.

ECN 3635 Marxism: 20th-Century Theory and Practice (3) Examines the development of varieties of Marxist theory and practice in the 20th century, compares the Soviet, European, Chinese and Latin American experiences with Marxist thought and practice. Offered alternate years. Course equivalents: HIS 3435 and POL 3435. Attribute: Upper-Division. Class not open to freshmen.

ECN 3640 Growth of the American Economic System (3) Registration approval: SBE coordinator. Prerequisites: ECN 1100, or ECN 2101 or 2102. Studies the development of the American economy, with particular attention to the rise of the modern business system and its impact on American society; gives corollary consideration of labor, agriculture, technology and the monetary system. Offered alternate years. Course equivalent: HIS 3640. Attribute: Upper-Division. Class not open to freshmen.

ECN 4310 International Political Economy (5) Examines the nature and dynamics of the global economy in relation to the economies and political systems of nations and to theories and models of national, regional and global economic growth. International trade, business and government policy are studied in this context. Offered alternate years. Course equivalent: POL 4310. Attribute: Upper-Division. Class not open to freshmen.

ECN 4316 Issues in Political Economy (5) Registration approval: SBE coordinator. Prerequisites: ECN 2101, 2102. Junior standing preferred or permission of instructor. Studies the interrelationship between politics and economics and their effect on human welfare. Capstone course for economics majors. Attributes: Upper-Division; and Writing Course. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences and textiles, clothing and interiors majors. Class not open to freshmen.

ECN 4641 History of Economic Thought I (1–3) Registration approval: SBE coordinator. Prerequisites: ECN 2101, 2102 or permission of instructor. A study of the development of economic ideas and philosophies from Moses to mercantilism. Focus is on ethics and economics in the biblical, classical, physiocratic and mercantilist schools of economic thought. Offered alternate years. May be repeated for credit up to 3 credits. Attributes: Upper-Division; and Writing Course. Class not open to freshmen.

ECN 4642 History of Economic Thought II (1–3) Registration approval: SBE coordinator. Prerequisites: ECN 2101, 2102 and 4641. Continuation of ECN 4641. Attribute: Upper-Division. Class not open to freshmen.

ECN 4900 Independent Study in Economics (1–5) Registration approval: Independent Study Agreement. The student proposes a topic of current interest in business to a professor in the School of Business and Economics. The student meets with the professor to discuss a bibliography and rough drafts before turning in the final draft of a paper. A 5-credit independent study requires a total of 30 pages of written work. In general, the number of pages of written

work must be six times the number of credits, or there must be equivalent work in exams or other requirements. May be repeated for credit up to 5 credits. Attribute: Upper-Division.

ECN 4940 Internship in Economics (1–5) Registration approval: Intern Learning Contract Req. Provides field-experience opportunities for students to relate and apply principles of business, faith, service and leadership to a professional business setting. Course consists of an internship in a professional business setting (minimum 10 hours per week) and an on-campus seminar. Internship placements must be approved prior to the internship experience or permission will not be granted to register for ECN 4940 credit. Additional information may be obtained from the Career Development Center or internship coordinator for the School of Business and Economics. A student's initial internship must be taken for at least 2 credits. Course equivalents: ACCT 4940 and BUS 4940. Attribute: Upper-Division. Class not open to freshmen and sophomores.

ECN 4941 Advanced Integrative Internship (1–5) Registration approval: Intern Learning Contract Req. Prerequisite: ACCT 4940. Provides students the opportunity to specialize their applied learning to economic issues and questions through individualized guidance with an economics faculty sponsor, first-hand experience in their internship sites, academic research and face-to-face interviews with professionals. May be repeated for credit up to 6 credits. Course equivalents: ACCT 4941 and BUS 4941. Attribute: Upper-Division. Class not open to freshmen and sophomores.

Faculty

Don Attebury, Visiting Assistant Professor of Accounting; B.S., University of Evansville, 1971; M.B.A., Indiana University, 1985; CPA, State of Indiana, 1979. At SPU from 2003.

Nancy Meade Christie, Associate Professor of Accounting; B.A., Marshall University; M. Acc., Virginia Polytechnic Institute and State University, 1986; Ph.D., Virginia Polytechnic and State University, 1990. At SPU since 2003.

Denise Daniels, Associate Professor of Management; B.A., Wheaton College, 1991; Ph.D., University of Washington, 1997. At SPU since 1996.

Jonathan C. Deming, Associate Professor of Economics; B.A., Whitman College, 1971; M.A., University of Oregon, 1974; Ph.D., 1979. At SPU since 1977.

Douglas A. Downing, Associate Professor of Economics; Undergraduate Director; B.S., Yale University, 1979; M.A., 1982; Ph.D., 1987. At SPU since 1983.

Albert M. Erisman, Executive in Residence; B.S., Northern Illinois University, 1962; M.S., Iowa State University, 1967; Ph.D., 1969. At SPU since 2000.

Randal S. Franz, Associate Professor of Management; B.A., California State University-Sacramento, 1982; M.A., 1985; M.A., Stanford University, 1988; Ph.D., 1991. At SPU since 1991.

Dan W. Hess, Professor of Finance; B.A., Wheaton College, 1971; M.B.A., University of Washington, 1975; Ph.D., University of Arizona, 1982. At SPU since 1977.

Gary L. Karns, Associate Dean and Associate Professor of Marketing; MBA/ISM Graduate Director; B.B.A., University of Oklahoma, 1976; M.B.A., 1977; Ph.D., University of Washington, 1987. At SPU since 1979.

Herbert E. Kierulff, Donald Snellman Chair of Entrepreneurship and Finance; Professor of Finance, B.A., Stanford University, 1959; M.B.A., University of Southern California, 1964; D.B.A., 1967. At SPU since 1980.

Kenneth E. Knight, Professor of Management and Information Systems; B.S., Yale University, 1959; M.S., Carnegie-Mellon University, 1961; Ph.D., 1964. At SPU since 1988.

Henry Peterson, Assistant Professor of Management; B.Sc., University of Calgary, 1993; M.Sc., University of Calgary/Latin American Energy Organization (OLADE), Ecuador, 1998. At SPU since 2003.

Joanna K. Poznanska, Professor of International Business; M.A., University of Warsaw, 1970; Ph.D., Technical University of Warsaw, 1976; postgraduate studies at Cornell University; Researcher, Woodrow Wilson School of Public and International Affairs, Princeton University, 1980–1981. At SPU since 1988.

James F. Rand, Clinical Professor; B.S., Marquette University, 1963; LL.B., LaSalle University, 1972; Ph.D., California Western University, 1976. At SPU since 1993.

Regina P. Schlee, Associate Professor of Marketing; B.A., University of Nevada, 1976; M.A., Washington State University, 1978; Ph.D., 1981. At SPU since 1984.

Richard L. Sleight, Instructor; B.A., University of Washington, 1977; M.Ed., 1980; Ph.D., 1989. At SPU since 1989.

Gerhard H. Steinke, Professor of Management and Information Systems; B.S., University of Alberta, 1975; M.A., Anderson University, 1984; M. Div., 1985; M.B.A., Ball State University, 1984; Ph.D., University of Passau, 1992. At SPU since 1992.

Ross E. Stewart, Professor of Accounting; B.Com., University of Auckland, 1977; M.Com., 1979; Diploma in Christian Studies, Regent College, 1981; M.T.S., 1983; Ph.D., University of Glasgow, 1987. Chartered Accountant, 1980. At SPU since 1986.

Lisa Klein Surdyk, Associate Professor of Economics; B.A., Seattle Pacific University, 1987; Ph.D., University of Washington, 1991. At SPU since 1991.

Jeffrey B. Van Duzer, Dean of School of the Business and Economics; Associate Professor of Law and Ethics; B.A., University of California-Berkeley, 1976; J.D., Yale Law School, 1979. At SPU since 2001.

Kenman L. Wong, Professor of Business Ethics; B.S., Biola University, 1986; M.B.A., University of Washington, 1987; Ph.D., University of Southern California, 1996. At SPU since 1997.

Chemistry and Biochemistry

Science Building
(206) 281-2140
www.spu.edu/depts/chemistry

Bruce D. Congdon, *Dean of the College of Arts and Sciences*

Lyle B. Peter, Chair; **Kevin Bartlett**, **Benjamin J. McFarland**, **Lyle B. Peter**, **Greg Phelan**, **Daisy Y. Zhang**; **Larry Gulberg**, **John Mouser**
Visiting Faculty

Chemistry is primarily concerned with matter, energy and their interactions. Chemists do a wide variety of things, including the following: They make new substances, including new materials and medicines; they design new ways to make known compounds; they isolate and determine chemical structures of naturally occurring substances; they elucidate the chemical bases of biological processes; they attempt to explain the changes matter undergoes; develop and apply analytical techniques for criminal investigations and environmental problems; they sell chemicals, teach chemistry and apply chemical knowledge to solve other societal and technological problems. Chemists are concerned about the effect their work and technology have on society and on individuals. They are in the forefront of efforts to make sure that technology serves humankind rather than vice versa. The curriculum is designed to serve persons desiring to enter a career in chemistry, biochemistry or science education, as well as those interested in pursuing further study in medicine, dentistry, pharmacy, engineering and the other sciences. To qualify for admission to the major, a student must have a minimum 2.5 grade point average in SPU chemistry courses.

Requirements for the Chemistry Major

The 2004–2005 academic year is the first of a two-year phase-in of a revised curriculum. The degree requirements listed below are primarily directed at new first-year students. Continuing students and advance transfers should consult the 2003–2004 SPU *Undergraduate Catalog*.

B.S. in Chemistry

67 credits in chemistry, including 47 upper-division; an additional 15 credits in math and 15 in physics

This course of study is recommended for a professional degree in chemistry or for those interested in doing graduate and other advanced work in chemistry, certain aspects of molecular biology, toxicology and forensic science. It is guided by recommendations of the American Chemical Society and should prepare the student for graduate work in chemistry or for employment as a chemist. In order to complete this degree in four years, generally a student should begin with CHM 1211 and MAT 1225 in the first quarter of the freshman year.

Required Chemistry Courses

CHM 1212 General Chemistry Lecture and Lab*	5–10
CHM 2940 Introduction to Research Methods	1
CHM 2540 Inorganic Chemistry Lecture and Lab	5
CHM 4542 Transition Metals Lecture	3
CHM 3371 Organic Chemistry Lecture and Lab	5
CHM 3372 Organic Chemistry Lecture and Lab	5
CHM 3373 Organic Chemistry Lecture and Lab	5
CHM 3225 Analytical Chemistry Lecture and Lab	5
CHM 3227 Analytical Chemistry Lecture and Lab	2
CHM 3228 Analytical Chemistry Lecture and Lab	2
CHM 3229 Analytical Chemistry Lecture and Lab	2
CHM 3401 Physical Chemistry Lecture	4
CHM 3402 Physical Chemistry Lecture	3
CHM 3403 Physical Chemistry Lecture	3
CHM 3460 Physical Chemistry Lecture	3
CHM 4899 Natural Sciences Seminar — Capstone	2
CHM electives from CHM courses*	13

Required Mathematics and Physics Courses

MAT 1225 Calculus	5
MAT 1226 Calculus	5
MAT 1228 Differential Equation	5
Physics in Science and Engineering	
PHY 1121 Physics in Science and Engineering	5
PHY 1122 Physics in Science and Engineering	5
PHY 1123 Physics in Science and Engineering*	5

* Most students would also take CHM 1211, but well prepared students do not need it.

**Excluding CHM 1100, 1110, 1330 and 3400; undergraduate research is a strongly recommended elective.

Physics for Science and Engineering

For students planning graduate studies in chemistry, additional mathematics (e.g., MAT 2228, MAT 2375 and MAT 2401) may be recommended by the advisor.

A reading knowledge of German or French is desirable for those who plan to do graduate work in chemistry. All students are urged to seek advising by a member of the chemistry/biochemistry faculty as early in their programs as possible.

B.A. in Chemistry

52 credits in chemistry, including 32 upper-division; an additional 15 credits in mathematics and 15 credits in physics.

This option is suited for students preparing for medical or dental school, careers in medical technology, pharmacy or related fields, or to teach chemistry at the secondary level. Those interested in careers in medicine, dentistry or other health related fields should refer to "Pre-Professional Health Programs."

Required Chemistry Courses	
CHM 1212 (5)* General Chemistry Lecture and Lab	*10
CHM 2540 Inorganic Chemistry Lecture and Lab	5
CHM 3371 Organic Chemistry Lecture and Lab	5
CHM 3372 Organic Chemistry Lecture and Lab	5
CHM 3373 Organic Chemistry Lecture and Lab	5
CHM 3225 Analytical Lecture and Lab	5
CHM 3401 Physical Chemistry Lecture	4
CHM 4361 Biochemistry Lecture and Lab	5
CHM 4899 Natural Sciences Seminar—Capstone	2
CHM Electives (11) from CHM courses Excluding CHM 1100, 1110 and 1330	11

Required Mathematics and Physics Courses	
MAT 1225 Calculus	5
MAT 1226 Calculus	5
MAT 1228 Differential Equations	5
PHY 1121 Physics for Science and Engineering	5
PHY 1122 Physics for Science and Engineering	5
PHY 1123 Physics for Science and Engineering (5) or PHY 1101, PHY 1102, PHY 1103	5

*Most students would also take CHM 1211, but well-prepared students do not need it.

General Physics

B.S. in Biochemistry

72 credits in chemistry and biology, including 59 upper-division in biology and chemistry; an additional 20 credits in mathematics and 15 credits in physics

The molecular aspects of the life sciences call for an interdisciplinary course of study in chemistry and biology, plus background support in physics and mathematics. This degree prepares students for graduate study in biochemistry and molecular biology. Biochemistry students interested in health sciences should refer to the Pre-Professional Health Sciences section on page 173 of the *Catalog*. In order to complete this degree in four years, generally a student should begin with CHM 1211 and MAT 1225 in the first quarter of the freshman year.

Required Chemistry and Biology Courses	
BIO 2101 General Biology	5
BIO 3325 Genetics	5
BIO 4325 Molecular Biology	5
CHM 1212 General Chemistry Lecture and Lab*	5–10
CHM 2940 Introduction to Research Methods	1
CHM 3371 Organic Lecture and Lab	5
CHM 3372 Organic Lecture and Lab	5
CHM 3373 Organic Lecture and Lab	5
CHM 3225 Analytical Lecture and Lab	5
CHM 3401 Physical Chemistry	4
CHM 4361 Biochemistry Lecture and Lab	5
CHM 4362 Biochemistry Lecture and Lab	5
CHM 4363 Biochemistry Seminar	3
CHM 4899 Natural Sciences Seminar—Capstone	2
CHM and BIO electives from CHM 2960, CHM 2540, CHM 4960, CHM 3227, CHM 3228, CHM 3229, CHM 3403, BIO 4352, CHM 3460, CHM4542, BIO 2102, BIO 2103, BIO 3350, BIO 4360; undergraduate research is a strongly recommended elective.	7

Required Mathematics and Physics Courses	
Math	20
MAT 1225 Calculus	5
MAT 1226 Calculus	5
MAT 1228 Differential Equation	5
MAT 1360* Statistics	5
PHY 1121 Physics in Science and Engineering	5
PHY 1122 Physics in Science and Engineering	5
PHY 1123 Physics in Science and Engineering (5) or PHY 1101*	5
PHY 1102 General Physics	5

PHY 1103 General Physics or MAT 2375 and MAT 2376	5
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Chemistry Minor

35 credits in chemistry/biochemistry, including 20 upper-division

Must include CHM 1212 General Chemistry II, 5 cr., CHM 3371, 3372 Organic Chemistry, 10 cr. Chemistry courses must include at least two of these five areas: organic, inorganic, analytical, physical and biochemistry.*

Total	35
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*Excluding CHM 1100, 1110, 1330, 2930, 4800, 4900, 4930 and 4940.

Chemical Education. Students preparing for the teaching profession at the elementary level should take at least CHM 1100 or CHM 1211. (For general science major requirements in elementary teaching, see the School of Education listing in this *Catalog*.) For junior high level a supporting endorsement provides an appropriate basis. A supporting endorsement can be obtained by completing a minor including CHM 1212, 2540, 3371, 3372 and 3225. CHM 3401 and CHM 4361 are also recommended. See School of Education for a definite description of the supporting endorsement. Students preparing for a secondary certificate should complete the requirements for a B.A. in chemistry including at least two quarters of physical chemistry.

Pre-Professional Health. The B.S. in biochemistry, or the B.S. or B.A. in chemistry including biochemistry courses, provide preparation for professional education in medicine, dentistry and similar health related careers. See the Pre-Professional Health section of the *Catalog*.

Chemistry Courses

CHM 1100 Introduction to Chemistry (5) Prerequisites: One-and-a-half years of high school mathematics including algebra, or permission of instructor; passing score on the SPU Mathematics Proficiency Exam or concurrent registration in the required course MAT 0120. This course is not recommended for students who have completed one year of high school chemistry. Examines the structure of matter and the tools and methods used by the chemist. Simple reactions and some current applications are studied. Can be used as preparation for CHM 1211. Includes laboratory. Attributes: Physical Sciences; and Natural Science B.

CHM 1110 Introduction to the Nature of Science (5) Provides a lecture, discussion and student participation course in the physical sciences with a chemistry emphasis. Examines basic revolutions in the development of scientific views and their relationships to religious faith and human values. Also examines selected scientific concepts and theories. Provides preparation for informed decision making on some current and future societal issues. Not recommended for students with more than one high school science course. Course equivalent: PHY 1110. Attributes: Physical Sciences; and Natural Science B.

CHM 1211 General Chemistry I (5) Prerequisites: Requires two years high school mathematics (including algebra) and a passing score on the SPU Mathematics Proficiency Exam (or completion of the required MAT 0120 credits), and one year of high school chemistry or CHM 1100. Introduces properties of matter, stoichiometry, chemical reactions, thermochemistry, states of matter, chemical bonding, and atomic and molecular structure. Includes laboratory. Attributes: Physical Sciences; and Natural Science B.

CHM 1212 General Chemistry II (5) Prerequisite: CHM 1211 or equivalent. Builds upon CHM 1211 topics. Introduces molecular and solid-state structure and bonding, properties of gases, liquids and solutions, concepts of thermodynamics, chemical kinetics, chemical equilibria, acid-base and oxidation-reduction reactions. Includes lab. Attribute: Physical Sciences.



CHM 1330 Organic and Biological Chemistry (5) Prerequisite: CHM 1211. Studies simpler laws of organic chemistry, nomenclature and classification. Simple chemistry of carbohydrates, lipids and proteins, integration of metabolisms, chemistry of heredity. Includes laboratory. Attributes: Physical Sciences; and Natural Science B.

CHM 2371 Organic Chemistry (5) Prerequisite: CHM 1211 or permission of instructor. This is the introductory course in organic chemistry. It reviews topics such as stoichiometry, acids and bases, structure and bonding theory, nomenclature, synthesis, thermodynamics, functional groups and reaction mechanisms as applied to organic chemistry. Laboratory work will emphasize basic methods of separation and purification representative substances.

CHM 2372 Organic Chemistry (5) Prerequisite: CHM 2371. A continuation of CHM 2371. Continues studies of principles of nomenclature, synthesis, thermodynamics, structure and reaction mechanisms to a broadening collection of organic functional groups. Introduces spectroscopic methods. Laboratory work will emphasize basic methods of synthesis of representative compounds, and obtaining their spectra and other properties.

CHM 2373 Organic Chemistry (5) Prerequisite: CHM 2372. A continuation of CHM 2372. Completes a survey of the properties of common organic functional groups and introduces topics of bio-organic chemistry. Laboratory includes some qualitative identification of unknown organic compounds using chemical, physical and instrumental techniques.

CHM 2540 Introductory Inorganic Chemistry (5) Prerequisite: CHM 1212. A systematic study of chemical principles as applied to inorganic systems. It may include inorganic nomenclature, solid-state structure, thermodynamics and bonding, general bonding theory, non-protonic acid-base theory, coordination chemistry and descriptive inorganic chemistry. Includes laboratory. Course equivalent: CHM 3540.

CHM 2930 Chemistry Practicum (1–3) Registration approval: Instructor. Selected students are assigned teaching, grading, laboratory preparation and/or tutoring responsibilities. May be repeated for credit up to 3 credits.

CHM 2960 Introduction to Research Methods (1–3) Designed for natural science majors as an introduction to the skills and methods used for research in the chemical sciences. May be repeated for credit up to 6 credits.

CHM 3225 Chemical Equilibrium and Analysis (5) Prerequisite: CHM 2372 or permission of instructor. Laboratory-oriented course dealing with chemical equilibria in solution and their applications to quantitative analysis. Some types of reactions to be studied are precipitation, acid-base, complex formation and oxidation-reduction. Traditional wet chemical and instrumental methods will be used. Attribute: Upper-Division.

CHM 3226 Quantitative and Instrumental Analysis (5) Prerequisite: CHM 3225. Laboratory-oriented course, dealing with the theory and practice of quantitative analytical chemistry with emphasis on instrumental techniques. Instrumental analysis will include a variety of separation, spectroscopic and electrochemical methods, possibly including engineering and clinical applications. Course equivalent: EGR 3226. Attribute: Upper-Division.

CHM 3227 Separation Science (2) Prerequisite: CHM 2373. Laboratory-oriented course dealing with the theory and practice of separation science (e.g., solvent extraction and chromatography). The laboratory will emphasize techniques of quantitative and instrumental analytical chromatography. Attribute: Upper-Division.

CHM 3228 Electroanalytical Chemistry (2) Prerequisite: CHM 3225. Laboratory-oriented course dealing with the theory and practice of electroanalytical chemistry. The laboratory exercises will be selected from quantitative analytical techniques of conductometry, potentiometry, coulometry, electrogravimetry, amperometry and voltametry. Attribute: Upper-Division.

CHM 3229 Analytical Spectroscopy (2) Prerequisite: CHM 3225. Laboratory-oriented course dealing with the theory and practice of atomic and molecular spectroscopy, especially as applied to quantitative analytical chemistry and molecular biology. The lectures and labs will include various topics of absorption, emission and scattering techniques. Attribute: Upper-Division.

CHM 3400 Physical Chemistry for Life Sciences (5) Prerequisites: CHM 2373, 3225 and MAT 1226. A survey of physical chemistry topics such as thermodynamics, statistical mechanics, kinetics, quantum chemistry and spectroscopy with examples and applications from the life sciences. Attribute: Upper-Division.

CHM 3401 Thermodynamics (4) Prerequisites: CHM 1211, PHY 1103 or PHY 1123, and MAT 1228 or permission of instructor. Studies equilibrium and non-equilibrium properties of gases, liquids and solids from thermodynamic processes. Engineering applications. Includes elements of statistical thermodynamics. Course equivalents: EGR 3401 and PHY 3401. Attribute: Upper-Division.

CHM 3402 Physical Chemistry II (3) Prerequisite: CHM 2540, PHY 1103 or PHY 1123, and MAT 1228 or permission of instructor. Studies quantum theory and group theory and their applications to spectroscopy, molecular and solid-state structures and bonding. Attribute: Upper-Division.

CHM 3403 Physical Chemistry III (3) Prerequisite: CHM 3225, PHY 1103 or PHY 1123, and MAT 1228 or permission of instructor. Studies statistical mechanics, chemical kinetics, physical and chemical equilibria, electrochemistry and selected related topics. Attribute: Upper-Division.

CHM 3460 Physical Chemistry Laboratory (1–2) Prerequisites: CHM 3225 or equivalent and CHM 3401, 3402 or 3403 (may be taken concurrently with CHM 3401, 3402 or 3403). Provides opportunity for several experiments with a written report for each experiment that includes an analysis of the reliability and limits of error of the results. May include computer applications. May be repeated for credit up to 4 credits. Attributes: Upper-Division; and Writing Course.

CHM 3540 Introductory Inorganic Chemistry (5) Prerequisites: CHM 2373, 3225. This is a systematic study of chemical principles as applied to inorganic systems. It may include inorganic nomenclature, solid-state structure, thermodynamics and bonding, general bonding theory, non-protonic acid-base theory, coordination chemistry and descriptive inorganic chemistry. Includes laboratory. Course equivalent: CHM 2540. Attribute: Upper-Division.

CHM 4361 Biochemistry (5) Prerequisite: CHM 2373. Studies chemical properties of biological compounds (carbohydrates, lipids, amino acids and proteins, and nucleic acids); metabolism (biochemical energetics, enzymes, electron transport and oxidative phosphorylation); and integration of metabolism (biochemical genetics and metabolic regulation). Includes laboratory. Course equivalent: BIO 4361. Attribute: Upper-Division.

CHM 4362 Biochemistry (5) Prerequisite: CHM 4361. Continuation of CHM 4361. Studies chemical properties of biological compounds (carbohydrates, lipids, amino acids and proteins, and nucleic acids); metabolism (biochemical energetics, enzymes,

electron transport and oxidative phosphorylation), and integration of metabolism (biochemical genetics and metabolic regulation). Includes laboratory. Course equivalent: BIO 4362. Attribute: Upper-Division.

CHM 4363 Biochemistry (3) Prerequisite: CHM 4362 or permission of instructor. Explores selected topics including immunoglobulins and the immune system; bacterial cell walls; membrane transport; hormone action; control of gene expression; muscle contraction; cell physiology; drug action; protein folding; HIV mechanisms; and mechanisms of infectious disease. Seminar format with leading researchers presenting current work. No laboratory. May be repeated for credit up to 6 credits. Course equivalent: BIO 4363. Attribute: Upper-Division.

CHM 4374 Advanced Organic Laboratory (3) Prerequisites: CHM 2373 and 3225. An advanced laboratory course using synthetic separation and instrumental techniques to study properties of organic compounds. Offered alternate years. Attribute: Upper-Division.

CHM 4542 Transition Metals (3) Prerequisites: CHM 2373 and 2540 (CHM 3402 recommended). The chemistry of the d- and f-block elements, with emphasis on the correlation of color, magnetic properties, structure and reactivity to fundamental theory. Topics from the current chemical literature will be included. Topics may include bioinorganic chemistry, organometallic chemistry and chemical applications of group theory. Offered alternate years. Attribute: Upper-Division.

CHM 4700 Selected Topics in Chemistry/Biochemistry (3) Registration approval: Instructor. An advanced course on any area of chemical science. It is designed to deepen the student's knowledge in one area of chemistry, expose him or her to the current research literature, and give him or her experience in writing and speaking critically on examples of recent research. Offered alternate years. Attributes: Upper-Division; and Writing Course.

CHM 4760 Advanced Synthesis (1–2) Prerequisite: CHM 2373 (CHM 4542 is recommended). A laboratory course involving organic and/or inorganic synthesis using advanced techniques such as the handling of air-sensitive compounds, vacuum distillations and vacuum-line transfers. Recommended especially for students who plan a research project involving synthesis. To be offered on demand. May be repeated for credit up to 4 credits. Attribute: Upper-Division.

CHM 4899 Natural Sciences Seminar (1) A capstone experience for seniors that explores current natural sciences topics in an interdisciplinary setting. Seminars addressing current research advances, ethical issues in science or the intersection of science, vocation and Christian faith are presented by faculty, students and guest scholars. Discussion and reflection incorporate appropriate readings. A minimum of two quarters of seminar must be completed during the senior year to fulfill the senior capstone requirement. May be repeated for credit up to 3 credits. Course equivalents: BIO 4899 and PHY 4899. Attribute: Upper-Division. Class open to seniors.

CHM 4900 Independent Project/Design in Chemistry/Biochemistry (1–10) Registration approval: Independent Study Agreement. Laboratory research, library research or other individual project. A final written report is required, and the student must report orally on his or her results at a Chemistry Department seminar. May be repeated for credit up to 15 credits. Attributes: Upper-Division; and Writing Course.

CHM 4930 Chemistry/Biochemistry Practicum (1–5) Registration approval: Instructor. Selected students are assigned teaching, grading, laboratory preparation and/or tutoring responsibilities. May be repeated for credit up to 5 credits. Attribute: Upper-Division. Class not open to freshmen and sophomores.

CHM 4940 Internship in Chemistry/Biochemistry (1–5) Registration approval: Intern Learning Contract Req. Provides a significant learning experience through a closely supervised work-study program. A final written report is required, and the student must report orally on his or her work experience at a Chemistry Department seminar. May be repeated for credit up to 10 credits. Attribute: Upper-Division. Class open to chemistry majors. Class not open to freshmen and sophomores.

CHM 4950 Current Topics in Chemistry/Biochemistry (1–5) Registration approval: Instructor. Deals with selected chemistry topics of general interest. No laboratory. May be repeated for credit up to 5 credits. Attribute: Upper-Division.

CHM 4960 Undergraduate Research in Chemistry/Biochemistry (1–10) Registration approval: Instructor. Laboratory research done with supervision/collaboration with a faculty research advisor. A final senior thesis or journal article is required. A report at the regional conference is expected. May be repeated for credit up to 15 credits. Attributes: Upper-Division; and Writing Course.

Faculty

Lyle Peter, Professor of Chemistry; B.S., Seattle Pacific College, 1972; Ph.D., University of Washington, 1979. At SPU since 1979.

Daisy Zhang, Associate Professor of Chemistry; B.S., Calvin College, 1989; Ph.D., The University of Chicago, 1993. At SPU since 1998.

Kevin Bartlett, Assistant Professor of Chemistry; B.S., Wheaton College, 1996; Ph.D., University of Washington, 2001. At SPU since 2002.

Greg Phelan, Assistant Professor of Chemistry; B.S. Chem.E., University of Rochester, 1994; M.S., SUNY Albany, 1998; Ph.D., University of Washington, 2003, M.Ed., 2003. At SPU since 2001.

Benjamin McFarland, Assistant Professor of Biochemistry; B.S., University of Florida, 1996; Ph.D., University of Washington, 2001. At SPU since 2003.

Classics

See Languages

Common Curriculum

See College of Arts and Sciences

Communication and Journalism

Marston Hall
(206) 281-2036
www.spu.edu/depts/commjournal

Bruce D. Congdon, *Dean of the College of Arts and Sciences*

William Purcell, Chair, **Richard Jackson**, Journalism contact, **Lorelle Jabs**, **Todd Rendleman**, **Debra Sequeira**

The Department of Communication and Journalism prepares graduates of competence and character who will understand communication as a social, intellectual, ethical and artistic process. They will also engage in communication and journalism as a responsible human behavior.

Admission to the Major

Applicants for a major in communication must display a cumulative GPA of 2.5 or higher (4.0 = A) in all college work applicable to the degree or 3.0 in the 45 credits immediately preceding application for the major.

Foreign Language Requirement

All students who complete the communication major must display proficiency in a foreign language. For ways of displaying proficiency, see the General Education section of this *Catalog* under Baccalaureate Degree Requirements. For those majoring in communication, the proficiency requirement is not satisfied as part of the community college direct transfer degree unless the transcript records completion of adequate foreign language coursework.

Requirements for Communication Major

55 credits; 28 upper-division

Both tracks require a common communication core. Each track then adds additional credits in specialized coursework.

Refer to pages 60–62 for a summary of degree requirements.

Departmental Core

COM 1101 Introduction to Interpersonal Communication	5
COM 1321 Public Speaking	5
COM 2323 Argumentation	5
COM 3001 Theories of Communication	5
JRN 3355 The Public and the Media	5
Total	25

Communication Studies Track

COM 3628 Foundations of Western Rhetoric or COM 3629 Modern Rhetorical Theory	5
COM 4142 Advanced Interpersonal Communication	5
COM 4265 Organizational Communication	5
COM 4899 Communication Seminar Capstone	5
Electives	10
Total	55

Note: Practical experiences such as internships, forensics practicum, journalism practicum and similar courses may be taken as part of the degree program and may be included in the major for up to 6 credits of the electives required.

Journalism Track

JRN 2101 Introductory Newswriting	5
JRN 2202 Public Affairs Reporting	5
JRN 2203 Editing and Design	5
JRN 3301 Media Law	5
COM 4177 Communication Ethics	5

JRN 4899 Journalism Seminar Capstone	5
Student Publications/Internships	3–5
Total	58–60

Requirements for Communication Minor

30 credits; a minimum of 15 upper-division

COM 1101 Introduction to Interpersonal Communication	5
COM 1321 Public Speaking	5
COM 3001 Theories of Communication	5
Electives in communication to complete the 30 credit minimum	15
Total	30

Requirements for Journalism Minor

30 credits; a minimum of 15 upper-division

JRN 2101 Introductory Newswriting	5
JRN 2202 Public Affairs Reporting	5
JRN 2203 Editing and Design	5

Select one of these:

JRN 3301 Media Law or COM 4177 Communication Ethics	5
JRN 3355 The Public and the Media	5

Select one series of courses from the following:

JRN 3801/02/03 Newspaper Production (6)	
JRN 3930/31/32 Publication Editor Practicum (6)	5

Total	30
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Note: Electives are to be selected from among other JRN courses and Eng 2215, 3205, 3301 and 4401.

Communication Courses

COM 1101 Introduction to Interpersonal Communication (5) In this fundamental course in communication between people, class sessions incorporate lectures with discussion and examples from popular culture and media. The focus of this course is on direct application of basic communication concepts essential to our daily lives. Topics include perception, gender and culture and their effects on ourselves and others; self-expression and disclosure; friendship, family and dating; verbal and nonverbal cues and their meanings; listening; and conflict management. Attributes: Arts and Humanities B; and Oral or Written Communication.

COM 1321 Public Speaking (5) Analyzes platform speaking; includes analysis, preparation and presentation of formal speeches. Includes rhetorical criticism of significant models. Recommended for students planning to major in communication; open to other students as well. Attributes: Arts and Humanities B; and Oral or Written Communication.

COM 1930 Forensics Practicum (1–2) Registration approval: Instructor. Provides experience in co-curricular speech activities. Meets weekly by arrangement; individual coaching conferences. May be repeated for credit up to 12 credits. Class not open to juniors and seniors.

COM 1931 Communication Practicum (1–2) Registration approval: Instructor. Provides field experience in communication activities with faculty guidance in selection, preparation and review; application to campus ministry teams, speakers' bureau and other contexts. May be repeated for credit up to 12 credits. Class not open to juniors and seniors.

COM 2227 Small Group Discussion and Leadership (5) Develops awareness of and experience in the processes of small, coacting group activity; examines and applies theories of structure, climate, roles, norms and leadership in planning and managing member participation. Explores group effort in fact finding, problem solving and decision making.

COM 2323 Argumentation: Art of Inference (5) Examines ambiguity, analysis, evidence, observation and inference; applies principles of reasoning to significant issues through extensive practice in public discourse, questioning, response to questions, refutation and negotiation.

COM 3001 Theories of Communication (5) Examines theories of human communication and introduces a range of research methodologies used in investigating and creating those theories. Prerequisite for COM 4142 and 4899. Attributes: Upper-Division; and Writing Course.

COM 3160 Conflict Management (5) Examines research in and techniques for conflict management. Includes theory, models and case studies in conflict in interpersonal, organizational and public contexts. Attribute: Upper-Division.

COM 3321 Advanced Public Speaking (5) Prerequisite: COM 1301 or 1321, or permission of instructor. Advances application of speech principles to prepare public address for various contexts; provides individualized instruction in research, organization, composition, style and presentation. Attribute: Upper-Division.

COM 3322 Persuasive Campaigns (5) Evaluates the role of persuasion in society; the role of symbolic persuasion; production and reception of persuasive messages; the persuasive event and the persuasive campaign; ethical questions in social influence. Attribute: Upper-Division.

COM 3628 Foundations of Western Rhetoric (5) Examines theories of communication and persuasion from ancient times to the fifth century A.D. Intensively studies selected Greek and Roman rhetorical treatises. Attributes: Upper-Division; and Writing Course.

COM 3629 Modern Rhetorical Theory (5) Examines theories of communication and persuasion from the 15th century to the present, with special emphasis on European and American rhetorical theorists. Attributes: Upper-Division; and Writing Course.

COM 3780 Introduction to Film (5) The goal of this course is to develop students' abilities to view films critically and to deepen their understanding of the film experience. The course first teaches analysis of narrative strategies, shot properties, *mise-en-scene*, editing, acting and the use of sound in film, particularly classical Hollywood cinema. The course then focuses on the study of different genres of films and how they present ideological points of view and fulfill certain wishes of the spectator. Course equivalent: TRE 3780. Attributes: Arts and Humanities A; Fine Arts Core; Upper-Division; and Writing Course. Class not open to freshmen.

COM 3930 Forensics Practicum (1–2) Registration approval: Instructor. Provides experience in co-curricular speech activities. Meets weekly by arrangement; Individual coaching conferences. May be repeated for credit up to 12 credits. Attribute: Upper-Division. Class not open to freshmen and sophomores.

COM 3931 Communication Practicum (1–2) Registration approval: Instructor. Provides field experience in communication activities with faculty guidance in selection, preparation and review; application to campus ministry teams, speakers' bureau and other contexts. May be repeated for credit up to 12 credits. Attribute: Upper-Division. Class not open to freshmen and sophomores.

COM 4142 Advanced Interpersonal Communication (5) Prerequisites: COM 1101 and 3001 or permission of instructor. Focuses on selected communication theories, research and application pertaining to romantic, friendship and family relationships. Attribute: Upper-Division.

COM 4177 Communication Ethics (5) Uses case studies to explore ethical foundations of media practice and to test methods of moral reasoning. Case studies consider business pressures, deception, truth telling, fairness, privacy, responsibility and social justice in the news business; persuasion and truth telling in advertising and public relations; and the responsibilities of entertainment industries in areas such as taste, violence, gender and race. Attributes: Upper-Division; and Writing Course.

COM 4180 Cultural Communication (5) Examines theory and literature of the ethnography of communication, with direct application in the description and analysis of language in its social context. Attribute: Upper-Division.

COM 4265 Organizational Communication (5) Examines how communication functions within organizations and explores use of communication to improve employee relationships and organizational effectiveness. Attribute: Upper-Division.

COM 4323 Performing Literature (5) Analyzes literary works for the purpose of presenting them in oral performance; provides opportunities for guided practical experience in storytelling, lyric poetry and dramatic reading. Attribute: Upper-Division. Class not open to freshmen.

COM 4607 Rhetoric of Dissent (5) Considers discourse in its rhetorical, historical, political, social and religious contexts and pays particular attention to women and minority voices. Attributes: Upper-Division; and Writing Course.

COM 4899 Communication Seminar Capstone (5) Prerequisites: Completion of 15 credits in communication major and COM 3001. Senior capstone course in the Communication Studies Track. Attribute: Upper-Division. Class not open to freshmen and sophomores.

COM 4900 Independent Study (1–5) Registration approval: Independent Study Agreement. Individual research and conferences in area of specialization. May be repeated for credit up to 15 credits. Attribute: Upper-Division. Class not open to freshmen and sophomores.

COM 4930 Instructional Practicum (1–5) Registration approval: Instructor. Provides selected students with experience as undergraduate teaching assistants in lower-division courses. May be repeated for credit two times. Attribute: Upper-Division. Class open to communication majors.

COM 4940 Coop Education: Internship in Communication (1–5) Registration approval: Intern Learning Contract Req. Prerequisites: 15 credits of B work in communication; an approved internship plan; and COM 3001. Provides supervised application of interpersonal and public communication skills in the marketplace. May be repeated for credit up to 5 credits. Attribute: Upper-Division.

COM 4941 Coop Education: Internship in Communication (1–5) Registration approval: Intern Learning Contract Req. Prerequisites: 15 credits of B work in communication; an approved internship plan; COM 3001. Provides supervised application of interpersonal and public communication skills in the marketplace. May be repeated for credit up to 5 credits. Attribute: Upper-Division.

COM 4950 Advanced Topics in Communication (1–5) Explores selected topics in communication, with emphasis on theories and research not normally examined in regular curriculum. Offered occasionally with specific topics identified in the *Online Time Schedule*. May be repeated for credit up to 15 credits. Attribute: Upper-Division.

Journalism Courses

JRN 2101 Introductory Newswriting (5) Develops basic writing skills essential for success in mass media. Topics include outlining basic structure of news business; writing leads; organizing stories; using Associated Press style; utilizing grammar, punctuation; developing interview techniques; covering speeches and press conferences. Class not open to freshmen.

JRN 2202 Public Affairs Reporting (5) Prerequisite: JRN 2101 Develops basic reporting skills while continuing instruction in newswriting. Encourages students to develop their own stories through document, online and human sources. Discusses both hard-news and feature writing styles.

JRN 2203 Editing and Design (5) Develops basic skills in editing and publication design of print media. Topics include copyediting; story and page design; headline writing; photo captions; photo sizing and cropping; proper use of graphics.

JRN 2801 Newspaper Production (1–2) Registration approval: Instructor. Laboratory for the student newspaper, the yearbook and other student publications. Students work under editors in a variety of production phases with access to a faculty advisor. Only 6 credits of JRN 2801, 2802, 2803, 3930, 3931 and 3932 total may be applied to the JRN track or minor. May be repeated for credit five times.

JRN 2802 Newspaper Production (1–2) Registration approval: Instructor. Laboratory for the student newspaper, the yearbook and other student publications. Students work under editors in a variety of production phases with access to a faculty advisor. Only 6 credits of JRN 2801, 2802, 2803, 3930, 3931 and 3932 total may be applied to the JRN track or minor. May be repeated for credit five times.

JRN 2803 Newspaper Production (1–2) Registration approval: Instructor. Laboratory for the student newspaper, the yearbook and other student publications. Students work under editors in a variety of production phases with access to a faculty advisor. Only 6 credits of JRN 2801, 2802, 2803, 3930, 3931 and 3932 total may be applied to the JRN track or minor. May be repeated for credit five times.

JRN 3301 Media Law (5) Explores all major areas of media law, their significance for society and the new challenges posed by cyberspace. Topics include First Amendment and the meaning of free expression; prior restraint; hate speech; libel; invasion of privacy; freedom of information; protection of news sources; free press/fair trial; obscenity and indecency; copyright; advertising; and telecommunications regulation. Attribute: Upper-Division.

JRN 3355 The Public and the Media (5) Applies relevant theories of mass communication to significant issues of media performance, informed by the historical development of industry structures, professional practices and changing technologies. Topics include journalism in the age of print, TV and cyberspace; propaganda, persuasion and media influence in the world of public relations and advertising; TV, cable, music, film and controversies over race, gender, violence, obscenity and children's programming; and emerging questions about the impact of the information superhighway. Attribute: Upper-Division.

JRN 3930 Publication Editor Practicum (1–3) Registration approval: Instructor. Provides opportunity for application of writing, editing and production skills in leadership roles in student publications. Open only to those officially selected for positions. No more than 6 credits of Publication Editor Practicum and Newspaper Production total may count toward the JRN track or minor. May be repeated for credit up to 6 credits. Attribute: Upper-Division.

JRN 3931 Publication Editor Practicum (1–3) Registration approval: Instructor. Provides opportunity for application of writing, editing and production skills in leadership roles in student publications. Open only to those officially selected for positions. No more than 6 credits of Publication Editor Practicum and Newspaper Production total may count toward the JRN track or minor. May be repeated for credit up to 6 credits. Attribute: Upper-Division.

JRN 3932 Publication Editor Practicum (1–3) Registration approval: Instructor. Provides opportunity for application of writing, editing and production skills in leadership roles in student publications. Open only to those officially selected for positions. No more than 6 credits of Publication Editor Practicum and Newspaper Production total may count toward the JRN track or minor. May be repeated for credit up to 6 credits. Attribute: Upper-Division.

JRN 4899 Journalism Capstone Seminar (5) Senior capstone course in the journalism track. Assignments include a final journalism portfolio and papers dealing with the relationship between Christian faith and journalism ethics. Attribute: Upper-Division. Class open to communication majors. Class not open to freshmen and sophomores.

JRN 4900 Independent Study (1–5) Registration approval: Independent Study Agreement. May be repeated for credit up to 15 credits. Attribute: Upper-Division. Class open to juniors and seniors.

JRN 4920 Directed Readings (1–5) Registration approval: Independent Study Agreement. Attribute: Upper-Division.

JRN 4940 Coop Education: Journalism Internship (1–5) Registration approval: Intern Learning Contract Req. Applies journalism skills in various employment settings. Students may suggest their own internships in consultation with the faculty supervisor as long as journalism skills are used and other internship criteria are met. No more than 5 of such credits may apply toward a journalism minor. May be repeated for credit up to 5 credits. Course equivalent: ENG 4940. Attribute: Upper-Division. Class open to juniors and seniors.

JRN 4941 Coop Education: Journalism Internship (1–5) Registration approval: Intern Learning Contract Req. Applies journalism skills in various employment settings. Students may suggest their own internships in consultation with the faculty supervisor as long as journalism skills are used and other internship criteria are met. No more than 5 such credits may apply toward a journalism minor. May be repeated for credit up to 5 credits. Course equivalent: ENG 4941. Attribute: Upper-Division. Class open to juniors and seniors.

Faculty

Lorelle Jabs, Assistant Professor of Communication; B.S., Oregon State University, 1986; M.S., 1988; Ph.D., University of Washington, 1997. At SPU since 2000.

Richard Jackson, Instructor of Journalism; B.A., Pennsylvania State University, 1977; M.A., University of Washington, 1995. At SPU since 1995.

William Purcell, Associate Professor of Communication; B.A., Auburn University, 1976; M.A., University of Alabama, 1983; Ph.D., Indiana University, 1986. At SPU since 1995.

Todd D. Rendleman, Assistant Professor of Communication; B.A., University of Illinois, Urbana-Champaign, 1992; M.A., 1994; Ph.D., 1999. At SPU since 1999.

Debra L. Sequeira, Professor of Communication; Chair of Communication; B.A., San Francisco State University, 1976; M.A., 1978; Ph.D., University of Washington, 1987. At SPU 1978–85 and since 1990.

Computer Engineering

See Engineering

Computer Science

Otto M. Miller Hall
206/281-2140
www.spu.edu/depts/csc

Bruce D. Congdon, *Dean of the College of Arts and Sciences*

Michael H. Tindall, Chair, **Charles Burris**, **Creed Jones III**,
Philip Prins, **Elaine Weltz**

Computer science is the discipline that studies the representation, storage and transformation of information utilizing automatic computing machines. The computer scientist is interested in developing computer software and hardware to analyze data and solve problems. In addition to understanding the organization and operation of modern computer systems, knowledge of the problems and applications in a related discipline is highly recommended.

The Department of Computer Science is dedicated to educating and preparing students for a variety of careers in business, scientific and engineering computing. We seek to provide a broad program of studies in theoretical and applied computer science informed by a Christian worldview, graduating students who are equipped for continued professional development and service.

Both bachelor of science (B.S.) and more application-oriented bachelor of arts (B.A.) degree options are available. A variety of computing equipment is available to SPU to support coursework and independent study activities. A fiber-optic Ethernet network links all parts of the campus computing environment. The open student laboratory contains about 30 Pentium/Athlon Windows PC systems, each connected to the Ethernet and with access to printers and appropriate software packages.

It is recommended that students majoring in computer science obtain their own Windows-compatible machine to gain the full experience of configuring and maintaining a computer system. A suitable system would be based on a fast Pentium or Athlon processor with 256 MB memory, a 20.0 GB hard drive, ethernet (or modern) and printer. Software should include Windows XP, Microsoft Visual Studio.NET, Microsoft Word and Adobe Acrobat Reader. Some courses may require other software that will be available in the student laboratory or for separate purchase. Most recommended software is available with educational pricing through the Computer and Information Systems Department or at the SPU Bookstore.

Preliminary Prerequisites

High school pre-calculus or math analysis is required.

Admission and GPA Requirement

A minimum 2.5 GPA (cumulative in all courses required for the major taken at SPU) is required for admission to the major. Additionally, a minimum 2.0 (C grade) must be earned in CSC 2430, and a minimum 1.7 (C- grade) must be earned in each other course required for the major.

Recommended for all degree options, because writing and communication skills are important for computer scientists, the following courses are recommended for all students majoring or minoring in computer science: ENG 3205 Writing in the Professions, COM 1101 Introduction to Interpersonal Communications.

Requirements for the B.S. in Computer Science Major

109 credits; 51 upper-division. Refer to chart on page 99; refer to pages 60–62 for a summary of degree requirements. The B.S. major is the traditional degree in computer science. It provides preparation for graduate studies or professional careers in computer science, with an emphasis on scientific and engineering foundations.

Requirements for the B.A. in Computer Science Major

Refer to pages 60–62 for a summary of degree requirements. The B.A. major is an applications-oriented degree in computer science. Each option provides preparation for professional careers in computing, with a specific emphasis on an area of applications.

B.A. — Business Option

88 credits; 48 upper-division. Refer to chart on page 99. This option combines preparation in the core areas of computer science with additional emphasis on business organizations, accounting, finance and marketing.

B.A. — Computer Systems Option

86 credits; 46 upper-division. Refer to chart on page 99. This option provides a thorough preparation in the topics and applications of computer science.

B.A. — Computer and Information Technology Degree Completion Option

68 credits plus specialization; 38 upper-division in core. This option combines preparation in the core areas of computer science with an approved CIT specialization. It is designed for students who have already completed appropriate computer-related technical certifications or associates degrees. See your computer science advisor for details.

Related Degree Programs

B.S. in Computational Mathematics. Combines computational and applied mathematics with a strong base in computer science. For more information, refer to the information under Mathematics.

B.S. in Computer Engineering. Combines strong bases in computer science, digital electronics and engineering. For more information, refer to the information in Engineering.

Requirements for the Computer Science Minor

35 credits; 15 upper-division

Core Courses

CSC 1230 Problem Solving and Programming	5
CSC 2430 Data Structures and Programming	5
CSC 2431 Data Structures II	5
Electives: CSC 3000–CSC 4999	15

Mathematics

Select one of the following:

MAT 1221 Survey of Calculus	5
MAT 1225 Calculus	5
MAT 1360 Introduction to Statistics	5
BUS 2700 Statistics for Business and Economics	5

Total **35**

Required Courses for Computer Science Degrees 2004–2005 Catalog	B.S.	B.A. Systems	B.A. Business
CSC 1230 Problem Solving and Programming	5	5	5
CSC 2430 Data Structures I	5	5	5
CSC 2431 Data Structures II	5	5	5
CSC 3150W Systems Design	5	5	5
CSC 3220 Applications Programming <i>or</i> CSC 2221 Programming Techniques	3	3	3
CSC 3221 Netcentric Computing	3	3	3
CSC 3310 Concepts in Programming Languages	4	4	4
CSC 3350 Systems Programming	4	4	4
CSC 3430 Algorithm Design and Analysis	4	4	4
CSC 3750 Computer Architecture		5	5
CSC 3760 Computer Organization	5		
CSC Electives (CSC 4000 - CSC 4850)	12	16	8
CSC Project Course (CSC 4150, 4760 or 4820)	4		
CSC 4898 Senior Capstone in Computer Science	2	2	2
MAT 1720 Math for Computer Science		5	5
MAT 1360 Introduction to Statistics		5	5
MAT 1221 Survey of Calculus * <i>or</i> MAT 1225 Calculus*			5
MAT 1225 Calculus*	5	5	
MAT 1226 Calculus	5	5	
MAT 1228 Series and Differential Equations	5	5	
MAT 2375 Probability Theory	2		
MAT 2376 Applied Statistics	3		
MAT 2720 Discrete Mathematics	3		
PHY 1121, 1122, 1123 Physics	15		
EE 1210 Logic System Design	5		
EE 3280 Microcontroller System Design	5		
ECN 2101 Microeconomics *			5
ACCT 2361 Financial Accounting			5
BUS 3250 Business Finance			5
BUS 3541W Marketing and Society <i>or</i> BUS 3614 Organizational Behavior			5
Total Upper-Division Credits Required	51	46	48
Total Credits Required	109	86	88

* This course fulfills a General Education requirement.

Computer Science Courses

CSC 1120 Introduction to the Computer (1) Explores how to use a (Windows-based) computer; describes computer hardware components; covers the basics of the Windowing environment, including the file system, running applications, editing messages and documents, and printing; and discusses the effects of computers in society.

CSC 1121 Internet and Email (1) Prerequisite: CSC 1120 or equivalent experience. Explores the following topics: Networks, electronic mail and the Internet; how to get an email account; logging onto and off of a computer; using the full capabilities of email; participating in newsgroups; downloading files using FTP; and using the World Wide Web and the Internet.

CSC 1122 Word Processing (1) Prerequisite: CSC 1120 or equivalent. What is word processing? Creating, modifying, saving and printing documents. Formatting and enhancing a document. Using columns, tables, footnotes, pictures and drawings. Using document "proofing" tools, such as spelling and grammar checkers and a thesaurus.

CSC 1123 Spreadsheets (1) Prerequisite: CSC 1120 or equivalent. What is a spreadsheet? This course covers creating, modifying, saving and printing spreadsheet documents; entering and using formulas and calculations; editing and importing data; incorporating graphs; and formatting and enhancing the appearance of a spreadsheet document. Course equivalent: BUS 1700.

CSC 1124 Databases (1) Prerequisite: CSC 1120 or equivalent. What is a database and a relational database management system? Designing a database. Defining tables. Defining and editing fields. Entering and editing data. Creating and using queries using one or more tables. Creating, formatting and enhancing forms and reports.

CSC 1126 Presentation Managers (1) Prerequisite: CSC 1120 or equivalent. What is a presentation manager? Covers designing an effective presentation; creating and editing slides, incorporating pictures, drawings and graphics; rearranging topics and slides; formatting and enhancing the look of a presentation; estimating the timing and sequencing of a presentation; and printing notes and handouts.

CSC 1130 Beginning Programming (5) Prerequisite: CSC 1120 or equivalent and two years of high school algebra. Covers designing a computerized solution to a problem, the software development lifecycle, and structured programming concepts and skills. In addition the course provides an introduction to a modern programming language.

CSC 1230 Problem Solving and Programming (5) Prerequisites: High school pre-calculus, math analysis or equivalent and demonstrable computer literacy. An introduction to computer science, this course covers problem solving methods and algorithm development; modern programming methodologies; and fundamentals of a high-level block structured language.

CSC 1800 Special Topics in Computer Usage (1–3) Prerequisite: CSC 1120 or equivalent. Presentation of a topic of current interest in computer usage. Topics may vary between offerings. May be repeated for credit up to 5 credits.

CSC 2220 Scientific and Engineering Programming (3) Prerequisites: MAT 1221 or MAT 1225, CSC 2430. Explores fundamentals of computer programming and problem solving for engineering and science students.

CSC 2222 Programming Techniques (3) Intermediate programming and problem solving techniques that will introduce a different programming language than used in CSC 2340.

CSC 2430 Data Structures I (5) Prerequisite: CSC 1230 or equivalent. Develops discipline in program design, style, debugging, testing. Introduces object-oriented design with classes, methods and encapsulation. Introduces dynamic storage allocation and pointers. Examines arrays, linked linear data structures and recursion.

CSC 2431 Data Structures II (5) Continuation of CSC 2430. Covers linked data structures, including trees and other non-linear representations; introduces graphs and networks; explores external data structures and techniques necessary for implementing different file organizations; and methods of organizing and accessing data on secondary storage devices (indexing, trees and hashing).

CSC 2950 Topics in Computer Science (1–5) Registration approval: Instructor. An introductory course studying a special interest topic in computer science. Topics and credits may vary between offerings. May be repeated for an unlimited number of credits.

CSC 2951 Directed Study: “C++” Programming (2) Prerequisite: Previous programming language experience. Presents fundamentals of the C++ programming language. Offered as a directed-study, instructor arranged course.

CSC 3150 Systems Design (5) Prerequisites: CSC 2431 and either CSC 3220 or 2221; CSC 2431 may be taken concurrently. Surveys issues and tools used in the analysis and design of software systems. Topics include requirements gathering; feasibility, process and data analysis; architecture; user-interface; and program design. Measures for the evaluation of specifications and designs. Attributes: Upper-Division; and Writing Course.

CSC 3220 Applications Programming (3) Prerequisite: CSC 2430. An implementation-oriented look at software development techniques used to create interactive applications, focusing on the use of object-oriented libraries to create user interfaces. Topics include event-driven programming, human-computer interaction (HCI), graphical user interfaces (GUI), database interfaces and tools for interface prototyping. Attribute: Upper-Division.

CSC 3221 Netcentric Computing (3) Prerequisite: CSC 2221 or CSC 3220. Introduction to networking and the Internet. Topics studied include network architectures, network security, communication and networking layer protocols, and the Web as an example of client-server computing. In addition, students will practice building Web applications. Attribute: Upper-Division.

CSC 3310 Concepts in Programming Languages (4) Prerequisite: CSC 2431. Explores organization and structure of programming languages; run-time behavior and requirements of programs; and programming language specification. Attribute: Upper-Division.

CSC 3350 Systems Programming (4) Prerequisites: CSC 2431 and either CSC 3750 or CSC 3760 or CPE 3760 or EE 3760. Introduction to operating systems and systems programming. Surveys systems software; operating system interface and functions; utilities and shell programming; linkers and loaders; translators; and processes, concurrency and concurrent programming. Course equivalent: CPE 3350. Attribute: Upper-Division.

CSC 3430 Algorithm Design and Analysis (4) Prerequisites: CSC 2431 and (MAT 1360 or MAT 2376), and (MAT 1720 or MAT 2720) and (MAT 1221 or MAT 1225). Covers the design and analysis of algorithms for searching, sorting, string processing, table management and graphs. Includes principles of computational complexity and analysis. Attribute: Upper-Division.

CSC 3750 Computer Architecture and Organization (5) Prerequisites: CSC 2431 (concurrent registration allowed), and MAT 1720 or 2720. Covers digital logic, computer structure, machine language, addressing, use and operation of assemblers, microarchitectures, instruction formats and the memory hierarchy. Attribute: Upper-Division.

CSC 3760 Computer Organization and Assembly Language (5) Prerequisites: CSC 2430 and EE 1210. CSC 2431 is recommended. Studies organization and structuring of the major hardware and software components of computers, including mechanics of information transfer and control within a digital computer system. Introduces computer architecture, machine instruction sets and assembly language programming. Course equivalents: CPE 3760 and EE 3760. Attribute: Upper-Division.

CSC 3899 Ethical and Social Issues in Computer Science (3) Covers ethical, social and societal-impact issues with which computer professionals must deal. Topics include such areas as invasion of privacy, computer crime, intellectual property, software theft, computer security, ethics in the workplace and artificial intelligence. Class format is a combination of lecture and discussion. Attributes: Upper-Division; and Writing Course. Class not open to freshmen and sophomores.

CSC 3900 Independent Study in Computer Science (1–5) Registration approval: Independent Study Agreement. Independent study and research in an advanced computer science topic. May be repeated for credit up to 10 credits. Attribute: Upper-Division.

CSC 3930 Practicum in Computer Science (1–5) Registration approval: Instructor. Studies applied computer science. Typically involves academic systems programming, teaching, grading, and lab preparation of tutoring responsibilities. Includes an assessment of Christian service issues or experiences. May be repeated for credit up to 10 credits. Attribute: Upper-Division.

CSC 3940 Internship in Computer Science (1–5) Registration approval: Intern Learning Contract Req. Provides a significant learning experience to be obtained in a supervised work-study environment. Typically involves work in systems analysis and design, advanced applications or systems programming. Includes an assessment of Christian service issues or experiences. May be repeated for credit up to 10 credits. Attribute: Upper-Division.

CSC 3950 Topics in Computer Science (1–5) Registration approval: Instructor. Advanced or special interest topics in computer science. May be repeated for credit up to 10 credits. Attribute: Upper-Division.

CSC 3960 Project in Computer Science (1–5) Registration approval: Instructor. Independent work on a significant project in computer science. May be repeated for credit up to 10 credits. Attribute: Upper-Division.

CSC 4150 Software Engineering (4) Prerequisite: CSC 3150. Covers topics in software engineering, including team programming, project planning and management, SDLC (software development life cycle) and software quality assurance. Course requirements include the design and implementation of a team software project. Course equivalent: CPE 4150. Attribute: Upper-Division. Class open to seniors.

CSC 4210 Theory of Computation and Algorithm (4) Prerequisite: CSC 3430. Introduction to theoretical topics in computer science. Includes formal languages, automata and parsing; computational complexity, analysis of algorithms; computability; and program correctness and verification. Attribute: Upper-Division.

“Today’s high-tech world needs competent computer scientists who can communicate clearly, think critically and act responsibly. Liberal arts plus Christian foundations plus a computer science major equals a good algorithm for becoming that type of professional.”

Elaine Weltz
Computer Science



CSC 4310 Compiler Design (4) Prerequisites: CSC 3310 and either CSC 3750, 3760, CPE 3760 or EE 3760. Studies programming language translation and compiler design concepts; language recognition, symbol table management, semantic analysis and code generation. Attribute: Upper-Division.

CSC 4350 Operating Systems (4) Prerequisite: CSC 3350 or CPE 3350. Introduces the major functions of operating systems. Covers processes and concurrency; concurrent programming; resource allocation, contention and control; scheduling, memory management and device management. Course equivalent: CPE 4350. Attribute: Upper-Division.

CSC 4410 Database Management (4) Prerequisites: CSC 3150. Introduces database concepts: data models; data description and data manipulation languages; query facilities; data security, integrity and reliability. Primary emphasis on relational data model; includes the design and implementation of database applications using a relational DBMS. Attribute: Upper-Division.

CSC 4510 Graphical User Interface Design and Programming (4) Prerequisite: CSC 3221. Introduction to programming in the Windows GUI environment. Comparison to other GUI environments. Attribute: Upper-Division.

CSC 4750 Computer Networks (4) Prerequisites: CSC 3750 or CSC 3760 or CPE 3760 or EE 3760. Recommended: CSC 2431. Studies concepts and terminology of computer networks, equipment and protocols. Emphasis is on local area networks. A laboratory project is required. Attribute: Upper-Division.

CSC 4760 Advanced Computer Architecture (4) Prerequisite: CSC 3750 or CSC 3760 or CPE 3760 or EE 3760. Recommended: CSC 2431. Studies the architecture of multiprocessor, vector, pipelined and parallel computers. Emphasis is placed on principles of parallelism and the architecture of state-of-the-art supercomputers. A team project is required. Course equivalent: CPE 4760. Attribute: Upper-Division.

CSC 4800 Advanced Issues in Computer Science (4) An advanced course studying a special interest topic in computer science. Topics and credits may vary between offerings. Computer science minors may take this course with instructor approval. May be repeated for an unlimited number of credits. Attribute: Upper-Division. Class open to computer science majors.

CSC 4810 Advanced Issues in Computer Science (4) An advanced course studying a special interest topic in computer science. Topics and credits may vary between offerings. Computer science minors may take this course with instructor approval. May be repeated for an unlimited number of credits. Attributes: Upper-Division; and Writing Course. Class open to computer science majors.

CSC 4820 Advanced Issues in Computer Science: Project (4) Registration approval: Instructor. An advanced course studying a special interest topic in computer science. A team project is required. Topics may vary between offerings. May be repeated for credit two times. Attribute: Upper-Division. Class open to computer science majors.

CSC 4898 Senior Capstone in Computer Science (2) This senior capstone course will explore topics and frontiers in computer science. Students will write a significant paper or design and implement an experimental project that investigates a current topic within the computer science discipline. Attribute: Upper-Division. Class open to computer science majors. Class open to seniors.

CSC 4900 Independent Study in Computer Science (1–5) Registration approval: Independent Study Agreement. Independent study and research in an advanced computer science topic. May be repeated for credit up to 15 credits. Attribute: Upper-Division.

CSC 4930 Practicum in Computer Science (1–5) Registration approval: Instructor. Studies applied computer science. Typically involves academic systems programming, teaching, grading, lab preparation or tutoring responsibilities. Includes an assessment of Christian service issues or experiences. May be repeated for credit up to 8 credits. Attribute: Upper-Division.

CSC 4940 Internship in Computer Science (1–5) Registration approval: Intern Learning Contract Req. Provides a significant learning experience to be obtained in a supervised work-study environment. Typically involves work in systems analysis and design, advanced applications or systems programming. Includes an assessment of Christian service issues or experiences. May be repeated for credit up to 8 credits. Attribute: Upper-Division.

CSC 4950 Topics in Computer Science (1–5) Registration approval: Instructor. An advanced course studying a special interest topic in computer science. Topics and credits may vary between offerings. May be repeated for credit up to 5 credits. Attribute: Upper-Division. Class open to computer science majors. Class not open to freshmen and sophomores.

CSC 4960 Project in Computer Science (1–5) Registration approval: Instructor. Independent work on a significant project in computer science. May be repeated for credit up to 8 credits. Attribute: Upper-Division.

Faculty

Charles H. Burris Jr., Associate Professor of Computer Science; B.S., University of Utah, 1965; M.S., 1967; Ph.D., University of New Mexico, 1974. At SPU since 1982.

Creed Jones III, Associate Professor of Computer Science; B.S., 1980, M.S., 1982, Oakland University; Ph.D., 2004, Virginia Tech. At SPU since 2003.

Philip R. Prins, Associate Professor of Computer Science; B.A. (Mathematics), Humboldt State University, 1976; B.A. (Botany), 1978; M.S., (Computer Science), University of Idaho, 1984; Ph.D., (Electrical Engineering), 1993, University of Idaho. At SPU since 1992.

Michael H. Tindall, Professor of Computer Science; Chair of the Computer Science Department; B.S., Seattle Pacific College, 1971; M.S., Ph.D., University of Illinois at Urbana-Champaign, 1975. At SPU since 1980.

Elaine V. Weltz, Assistant Professor of Computer Science; B.A., Seattle Pacific College, 1974; M.MUS., University of Southern California, 1978; B.S., Seattle Pacific University, 1984.; M.S.E., Seattle University, 1989. At SPU since 1984.