Daystar Program (Nairobi, Kenya)
The Christian College Consortium also sponsors a study program at Daystar University in Nairobi, Kenya. Programs of study include communications, business administration and management, education, community development, and Bible and Christian ministries. All instruction is in the English language, offered by a faculty composed primarily of African nationals. Admission to Daystar is limited to Consortium students in their junior or senior years.

Fashion Institute of Design and Merchandising (FIDM) Program (Los Angeles, California)
Students have an option of pursuing a concentrated year of training in interior design by participating in the liaison program with the Fashion Institute of Design and Merchandising (FIDM) in Los Angeles. The interior design program at FIDM is accredited by the Foundation for Interior Design Education Research. Students electing to participate in the FIDM liaison should apply in their junior year and attend during their senior year. Students considering this option should seek advisement early in their academic careers in order to meet the requirements of both FIDM and SPU.

Fashion Institute of Technology (FIT) Program (New York, New York)
Students in the textile and clothing program who have major status and have maintained a satisfactory grade point may select from nine additional specializations if they are accepted into the liaison program with the Fashion Institute of Technology in New York City. Those students who choose the FIT option must be accepted into the major and work closely with their advisor in selecting courses that best prepare them for their chosen major. Specializations offered through the liaison program with FIT include accessories design, advertising and communication, advertising design, manufacturing management, fashion design, fashion buying and merchandising, jewelry design, textile/surface design, or textile development and marketing.

Soongsil University (Seoul, Korea)
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.

Art

Requirements for the Art Major
Emphasis in Studio Arts
(68 credits; 34 upper-division)

Core Courses
Art 1102, 1103, 1104 Designing Drawing ...................................... 9
Art 1202, 1203, 1204 Designing Studio ........................................ 9
Art 2302 Painting Studio, Oil or Acrylic ...................................... 3
Art 2722 Sculpture Studio ....................................................... 3
Art 2421 Printmaking Studio ..................................................... 3

Studio Arts Emphasis Courses
Art 3112 Figure Drawing or
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 4236 Portfolio .................................................................. 1
Art 4910 Senior Seminar and Exhibition ................................. 1
Art 4966 Senior Studio Project ................................................ 3

Adjunct Faculty
Michael Caldwell, Chair, Roger Feldman, Laura Lasworth, Virginia Causey, Susan Haas, 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, begin work professionally or enter the field of art education. 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 senior art majors, as a condition of graduation, are required to participate in the Senior Exhibition. The exhibition is held during the last four weeks of Spring Quarter. 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.

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

Michael Caldwell, Chair, Roger Feldman, Laura Lasworth, Virginia Causey, Susan Haas, Liza Halvorsen, Melissa Meier, Adjunct Faculty

Accounting
See Business and Economics, School of

Anthropology
See Sociology
Art Electives
(Four quarters of study in areas of student choice; must be upper-division) ................................................................. 12
Total Credits ....................................................................... 68

Requirements for the Art Major Emphasis in Visual Communication
(74 credits; 44 upper-division)
Core Courses
Art 1102, 1103, 1104 Drawing Studio ........................................... 6
Art 1202, 1203 Design Studio ..................................................... 6
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 Courses
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 ................................................................ 1
Art 4910 Senior Seminar and Exhibition ............................. 1
Art 4943 Art Internship ........................................................... 3
Total Credits ........................................................................... 71

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 Courses
Art 2302 Painting Studio, Oil or Acrylic .................................... 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) ................................................................. 6
Total Credits ........................................................................... 43

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 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 art and design to 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. 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. Class open to freshmen and sophomores.
ART 2201 INTRODUCTION TO COMPUTER ART (3) Prerequisites: ART 1102, 1103, 1202, 1203. 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–WATER SOLUBLE OIL (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, 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) Expects 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 techniques. Extra fee. Class 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 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. Prerequisites: ART 3202. Continued 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 3302 PAINTING STUDIO ADVANCED I–WATER SOLUBLE OIL (3) Prerequisites: 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, collagraph 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 and sophomores.

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 and sophomores.

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 and sophomores.

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 and sophomores.

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 and sophomores.

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 and sophomores.

ART 3606 HISTORY OF ASIAN ART (5) Explores 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 and sophomores.

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/artistic as vehicles for investigation. Attributes: Arts and Humanities A; Fine Arts Option; and Upper-Division. 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, 2205, 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 3208. 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 resume 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 4222 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 (3) 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 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 required. 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, sophomores and juniors.

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 (1) 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 3 credits. Attribute: Upper-Division. Class open to fine and visual arts majors. Class not open to freshmen, sophomores and juniors.

Biochemistry
See Chemistry

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

Richard L. Ridgway, Chair, Cynthia R. Bishop, Bruce Congdon, 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 of 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
(Refer to pages 68–70 for a summary of degree requirements.)

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 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 4815, BIO 4820, BIO 4825, BIO 4980, BIO 4981 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 (see chart), 10 elective credits are required from among the following: BIO 3325, 3434, 4256, 4413 and 4418. Other recommended courses include CHM 3225 and 3400, FCS 3340, HSC 3395, MAT 1112/1114 or 1221, PE 3590 and SOC 1110.

**Option III (Emphasis in Biotechnology/ Molecular Biology)**
(108–128 credits; 28–30 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 Cellular Biology and Genetics)**
(85 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 Science Programs.”

In addition to the requirements listed below (see chart), 25 elective credits are required. Of these, 15 credits should be selected from among the following: BIO 3320, 3350, 4325, 4330, 4361, 4362, 4418, 4420 and 4615. Another 10 credits should be selected from the following: BIO 2129, 2130, 3432 and 4413 (or 4415).

**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 teaching careers are strongly advised to take BIO 4330, CHM 3225 and CMH 3400.

**Admission and Requirements for the Biology Minor**
(34-38 credits; 15 upper-division)
Applications are considered individually by the biology faculty, but the normal minimum requirement for admission to the minor will be a GPA of 2.0 in biology courses. Note: Some of the courses in elective categories have prerequisites in chemistry.

**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:
**Molecular and Cellular Biology**
BIO 3325 Genetics (5)
BIO 3350 Immunology (3)
BIO 3351 General Microbiology (5)
BIO 4352 Cell Biology (5)
BIO 4325 Molecular Biology (5)
**Anatomy and Physiology**
BIO 2129 Human Anatomy and Physiology (5)
BIO 2130 Human Anatomy and Physiology (5)
BIO 4413 Animal Physiology (5)
BIO 4415 Plant Physiology (5)
BIO 4418 Neurobiology (5)
BIO 4420 Histology and Microscopic Technology (5)
BIO 4256 Environmental Physiology (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 4815 Aquatic Ecology (5)
BIO 4820 Ecomorphology (5)
BIO 4825 Forest Ecology (5)
BIO 4950 Special Studies in Biology (3)
BIO 4981 Marine Ecology (5) ......................................... 120
Total ........................................................................... 34–38
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<th>Required Courses</th>
<th>B.S. I</th>
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<th>B.S. III</th>
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<td>CHM 3226 Quantitative and Instrumental Analysis or CHM 3400 Physical Chemistry for the Life Sciences or CHM 3540 Introductory Inorganic Chemistry or BIO 4960 Statistical Inference in Biological Research</td>
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### Required supporting courses, cont.

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<td>PE 3580 Exercise Physiology</td>
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<td>PSY 2470 Life Span Developmental Psych. or PSY 4420 Adolescent Developmental Psych.</td>
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<td>PSY 4460 Abnormal Behavior</td>
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<td>Required from Shoreline Community College BioSc 260 Tissue Culture and Staining (4) and BioSc 285 Media and Solutions Prep. (2)</td>
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<td>107*</td>
<td>108–128*</td>
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*No more than 6 credits of BIO 4950 and no more than 5 credits in BIO 4900, 4930, 4940, 4978 or 4979 may be applied to a B.S. or B.A. degree in biology.

### Biology Courses

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

#### BIO 1100 BIOLOGICAL SCIENCE (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 2101 GENERAL BIOLOGY (5)
- Prerequisites: BIO 2101 or permission of instructor. 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 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 2103 GENERAL BIOLOGY (5)
- Prerequisite: BIO 2101 or permission of instructor. 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 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 3130 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 translation. Biotechnology and its applications are also presented. Biological statistics are emphasized throughout the course. Includes laboratory. Attribute: Upper-Division.

#### BIO 3330 IMMUNOLOGY (3)
- Prerequisites: BIO 2101 or 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 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 3456 Mycology (3) Prerequisite: BIO 2103. Considers the members of the Kingdom Fungi and some pseudofungal organisms. We will consider 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 of the San Juan Islands and surrounding waters. Class activities include field observations, lectures and laboratory study. Offered alternate years at the Blakely campus. Extra fee. Attribute: Upper-Division.

BIO 4256 ENVIRONMENTAL PHYSIOLOGY (5) Prerequisites: BIO 2102 and CHM 2372. 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, gel electrophoresis, and DNA 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, phylogenetic 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 2371. 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 STATISTICAL INFERENCE IN BIOLOGICAL RESEARCH (5) Prerequisites: BIO 2102 or 2129, BIO 4352 recommended. 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. Attributes: Upper-Division. Extra fee.


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 2372. 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 2371. 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 2372. An introduction to the neurosciences, focusing on fundamental concepts and comparative aspects of neuronal 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 2372. 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. Attributes: 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 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 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 and biotic 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 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 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 required. 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); Galapagos 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.

BIO 4980 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 4981 MARINE ECOLOGY (1-5) ▲
Prerequisites: BIO 2102, 2103. Considers recent advances in marine ecology. Symbiosis, 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.

Faculty
Cynthia R. Bishop, Assistant Professor of Biology; B.S., Seattle Pacific University, 1980; D.V.M. Washington State University, 1984; Post-Doctoral Fellow, Internal Medicine, Washington State University, 1985–1987. At SPU since 2000.

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 discipline 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 practices 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.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) 281-2899
www.spu.edu/blakely

Timothy Nelson, Director
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 eelgrass beds. 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 see the preceding “Biology” section of this Catalog. For other courses, contact the director of the Blakely Island Field Station.

Business and Economics, School of
David L. McKenna Hall
(206) 281-2970
www.spu.edu/depts/sbe

Jeffrey Van Duzer, Dean, Jonathan Deming, Denise Daniels, Douglas Downing, Al Erisman, Randal Franz, Loren Gustafson, Dan Hess, Gary Karns, Herbert Kierulf, Kenneth Knight, 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 distinctive:

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

First, SBE seeks to provide a business education that is permeated by the influence of historic Christian faith, ethics and character. The University is committed to an expression of Christian faith that is both evangelical and ecumenical. Graduates should gain a basic grasp of the Christian faith and understand how it applies to business situations. We are committed to the promotion of integrity and strong character in the marketplace.

Second, SBE seeks to be a superior provider of applied learning. Several factors contribute to this distinctive including small class sizes, location and connection with the Seattle business community. All courses are taught by faculty; no teaching assistants are utilized in the classroom. The curriculum stresses both active, applied learning activities (e.g., problems, cases, simulations, role playing and field-based projects), as well as extensive interaction with business executives (e.g., required internships for business administration majors, mentors, service learning opportunities and guest speakers).
Business and Economics, School of

Third, SBE is committed to a collaborative learning community. Collaborative activities promote active learning, bridging the gulf between students and teachers, creating a sense of a learning community and ensuring that knowledge is created, not just presented. In light of SBE’s mission and distinctives, each graduate should be able to do the following:

1. Analyze business situations through the lens of Christian faith and ethics.
2. Work effectively in teams.
3. Facilitate the completion of group projects.
4. Communicate effectively orally (including presentations) and in writing.
5. Use quantitative analysis to aid decision making.
6. Utilize information technology.
7. Apply critical-thinking skills to business problems.
8. Self-assess personal abilities, strengths and weaknesses.

In addition, business administration graduates should be able to do the following:

1. Apply the principles of servant leadership developed through interacting with role models and provide service and leadership to business, professional, community and church organizations.
2. Apply in-depth knowledge in one of the following areas: management, marketing, finance, economics, international business, e-commerce or information systems.

Accounting graduates should also be able to do the following:

1. Apply the principles of servant-leadership developed through interacting with role models and provide service and leadership to business, professional, community and church organizations.
2. Apply knowledge of accounting history, concepts, reporting, regulations, professional responsibility, financial analysis and ethics to real-world business situations.
3. Have in-depth knowledge in specialized accounting areas — financial, managerial, taxation, information systems, auditing and/or international.

Admission to Majors in the SBE

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) e-commerce; (2) economics; (3) finance; (4) information systems; (5) international business; (6) management; and (7) 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 when 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 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 2.7 cumulative GPA from all institutions and a minimum of 2.7 cumulative GPA in all SBE courses. Students who enter SPU as freshmen should 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 2.7 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.

Master’s Programs in the SBE
See the SPU Graduate Catalog for details about the M.B.A. and M.S. in information systems management degree programs, or call (206) 281-2753 to request information.

Accounting
Ross E. Stewart, Contact Person
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 68–70 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. Take three graduate courses per quarter in the summer following completion of their senior year, and thereafter for four more quarters (five quarters in total).

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

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 Accounting ................................. 5
ACCT 2362 Managerial Accounting ............................... 5
BUS 2600 Managerial Communication ........................... 2
BUS 2700 Statistics For Business and Economics ............. 5
These six courses are 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

Business and Economics, School of
“At Seattle Pacific University, it is a privilege to provide students with a foundation in the Christian faith so that they will make a positive difference in businesses, governmental institutions, other places of work and in their communities. As faculty, we demonstrate to students how the Christian faith relates to what they are learning and how Christian ethics can be applied in the workplace and in their personal lives.”

Lisa Klein Surdyk
Economics
Accounting Courses

**Business and Economics**

**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. Provides an introduction to the income tax structure and basic concepts of tax law relating to individual, corporate, partnership and estate income tax. 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.

**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.

**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.

**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.


**ACCT 4352 ACCOUNTING THEORY AND PROBLEMS (5)** Registration approval: SBE coordinator. Prerequisite: ACCT 3352. 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 required. 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 of 10 hours/week) and an on-campus seminar. Internship placement must be arranged prior to registration. Additional information may be obtained from the Career Development Center or internship coordinator for the School of Business and Economics. 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 required. 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; first-hand 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.

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**Business Administration**

**Douglas A. Downing, Contact Person**

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, as well as a concentration selected from one of the following areas: e-commerce, economics, finance, information systems, international business, management and marketing. Students in all concentrations will take the following common core of classes described below under General Core.

**Requirements for the Major**

(95 credits)

(Refer to pages 68–70 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 complete at least one 15-credit concentration. A business administration major may complete two concentrations, but one of the concentrations should be completed during the junior year to avoid possible schedule conflicts. 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.
Core requirements 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
Core requirements 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 .................. 5
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 four requirements may be completed during the
junior or senior year:
BUS 3620 Management Information Systems ............... 5
BUS 3828 International Business ............................. 5
BUS 4940 Internship ............................................. 2
BUS xxxx An upper-division elective of the student’s choice
from ACCT, BUS or ECN ......................................... 3
Total general core .................................................. 80

In addition to the general core, students must take 15
credits in one of the following concentrations:
E-Commerce Concentration
BUS3631 Entrepreneurship .................................... 5
BUS3625 E-Commerce and the Networked World .......... 5
BUS4625 The Organization’s Presence on the Net .......... 5
Economics Concentration
ECN 3101 Intermediate Macroeconomics ................... 5
ECN 3102 Applied Economics .................................. 5
ECN 4641 History of Economic Thought .................... 5
Finance Concentration
BUS 3251 Investments .......................................... 5
BUS 4274 Problems in Corporate Finance ................. 5
BUS 4275 Practice of Finance .................................. 5
Information Systems Concentration
CSC 1230 Problem Solving and Programming
or CSC 1130 Beginning Programming ....................... 5
BUS 4620 Computer Networks .................................. 5
BUS 4622 Information and Database Systems ............ 5
International Business Concentration
These are the requirements for the international business
concentration.
1. Students need to complete the 15 credits in
international-business courses approved by the
SBE undergraduate committee.
2. These 15 credits must include BUS 3830
International Business Seminar or SBS 4911 Latin
American Studies Program: Business Seminar
3. Other SPU courses that can be counted for
the international business concentration include BUS
3548 International Marketing; ACCT 4351
International Accounting; ECN 4310 International
Political Economy; THEO 3610 Living in Another
Culture and some sections of BUS 4661 Special
Topics in Management.
4. To complete the concentration, student must
participate in the SPU Business Abroad Study
program, or the business program in the Latin
American Studies program through the CCCU or
another study-abroad program approved by the SBE
Undergraduate Committee. Normally some of the
work for the concentration will be taken as
part of the study abroad program.
5. Students need to complete 15 credits of foreign
language beyond the SPU competency requirement.
For example, this requirement can be met by 15
credits in SPU foreign language courses numbered
2000 or above or by demonstrating fluency in a
language other than English.
Management Concentration
BUS 3631 Entrepreneurship .................................... 5
BUS 3657 Human Resource Management .................. 5
BUS 4660 Managing Systems ................................. 5
Marketing Concentration
BUS 3542 Marketing Research ................................ 5
BUS 4542 Consumer Behavior ................................ 5
BUS 4543 Marketing Management ........................... 5
Total ................................................................. 95

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 2.7 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.
ECN 1100 or ECN 2101 or ECN 2102 ....................... 5
ACCT 2361 Financial Accounting .......................... 5
BUS 4899 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 and Economics,
School of
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 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 e-mail 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 3250 BUSINESS FINANCE (5) Registration approval: SBE coordinator. Prerequisite: ACCT 2381. 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 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 business administration and economics, business administration, business and economics, economics and marketing majors. Class not open to freshmen.


BUS 3439 MOTIVATION AND LEADERSHIP (5) Registration approval: SBE coordinator. Prerequisite: BUS 3250. Studies the theories and principles of motivation and leadership with practical application in business, church, community and educational settings. Course equivalent: PSY 2439. 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, questionnaire development, secondary and primary data, sampling, processing and interpreting data, evaluation and effective presentation of findings. Attribute: Upper-Division. Class open to business admin and economics, business administration, business and economics, economics and marketing 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 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 from multinational firms. The course also focuses on ethical issues concerning the global diversity of customs and moral values and legal 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, economics, family and consumer sciences, food and nutritional sciences, and textiles, clothing and interiors 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 3625 E-COMMERCE AND THE NETWORKED WORLD (5) Registration approval: SBE coordinator. Prerequisite: BUS 3620. This course provides a general introduction to the World Wide Web and the networked economy. This course will explore how information technologies are bringing dramatic changes to every area of economic and personal life. It will explore the opportunities and challenges that abound such as fluid organizational structures, increased globalization, disintermediation of existing industry structures, 24/7 services, networked communities, increased availability of information, formation of supplier-producer-customer partnerships, etc. A review of the information technologies that are shaping the e-world will be provided. Attribute: Upper-Division. Class open to undergraduate students. Class not open to freshmen and sophomores.

BUS 3631 ENTREPRENEURSHIP (5) Registration approval: SBE coordinator. Prerequisite: ACCT 2381. Studies the major elements of innovation and new enterprise formation and growth. Examines in-depth through lectures, guest speakers, videos and case studies 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 business admin and economics, business administration, business and economics, economics and marketing 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 resource 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 and economics 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, fund raising, 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 business administration and economics, business administration, business and economics, economics and marketing 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. Uses computers for solving quantitative management decision problems. Includes optimization with derivatives; marginal analysis; 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 3720 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 (3-5)
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, leading and special fund raising. 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 include mergers and acquisitions, forecasting and cash budgeting, valuation techniques and capital structure issues. Attribute: Upper-Division. Class open to accounting, business administration and economics, business administration, business administration and economics, 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. Prerequisites: BUS 3274 and BUS 3614 or BUS 3630. Analyzes the decision-making process in finance and control of such areas as capital budgeting, management of investment funds, financial planning and financial management. Attribute: Upper-Division. Class not open to freshmen.

BUS 4276 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 and sophomores.

BUS 4277 MANAGEMENT SYSTEMS (5)
Registration approval: SBE coordinator. Prerequisites: BUS 3541 and 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 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 and economics, 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. Analyzes the components, development and management of computer networks and consumer networks. 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 and economics, 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, BUS 3625. This course provides a framework for an organization to evaluate, create and implement a successful net presence through the use of e-commerce tools. The areas covered include creation of the organization’s intranet, extranet and Internet; building communities with suppliers, employees, customers and other stakeholders; evaluation and design of Web sites through the use of existing Web development tools; economic analysis of an organization’s e-commerce potential and marketing the net opportunities to employees, management, owners, customers, suppliers, etc. Attribute: Upper-Division. Class open to undergraduate students. Class not open to freshmen and sophomores.

BUS 4640 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 and economics, business administration, business administration and economics, 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 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.
Economics

Douglas A. Downing, Contact Person

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 an 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 the Business Administration section for the economics concentration in the business administration major.)

Requirements for the Major

(70 credits)
(Refer to pages 68–70 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

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

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 or
- BUS 3710 Optimization and Statistics .......................... 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:

- BUS 4900 Independent Study in Business (1-5)
- BUS 4910 Internship in Business (1-5)
- BUS 4920 Internship in Business (1-5)
- BUS 4930 Business and Economics Practicum (1-3)
- BUS 4940 Internship (1-5)
- BUS 4950 Special Topics in Spirituality and Business (1-5)
- BUS 4990 Strategic Management (5)
- BUS 4999 Business Ethics (5)

Select one course from the following:

- BUS 4900 Independent Study in Business (1-5)
- BUS 4910 Internship in Business (1-5)
- BUS 4920 Internship in Business (1-5)
- BUS 4930 Business and Economics Practicum (1-3)
- BUS 4940 Internship (1-5)
- BUS 4950 Special Topics in Spirituality and Business (1-5)
- BUS 4990 Strategic Management (5)
- BUS 4999 Business Ethics (5)
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 GEO 1110, POL 1110 or POL 1120.

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 4899 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 2.7 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. Prerequisites: 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 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.
104
Business and Economics, School of

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 4941 ADVANCED INTEGRATIVE INTERNSHIP (1-5) Registration approval: Intern Learning Contract required. 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.

Executive Advisory Council
The purpose of the Executive Advisory Council (EAC) is to partner with faculty and staff in providing students with the following:

- A high-quality business education
- Integration of business theory and practice
- Personal and spiritual guidance
- Preparation for productive and meaningful careers

Executive Advisory Council Members
Charles L. Anderson, Chairman, TELTONE CORPORATION
Douglas G. Burleigh, Associate, LEADERSHIP DEVELOPMENT FOUNDATION
Nancy L. Cahill, Member-Attorney, HOLMAN CAHILL GARRETT IVES & OLIVER, PLLC
Alicia Cameron, Director, Product and Casualty Marketing, SAFECO INSURANCE COMPANIES
Luther J. Carr Jr., President, ENVIRONMENTAL HOUSING GROUP
F. Kemper Freeman, President, BELLEVUE SQUARE MANAGERS INC.
Scott D. Griffin, Vice President and CIO, THE BOEING CO.
Frank Haas, President, FLORIDA LEISURE COMMUNITIES
Michael R. Hallman, Owner, THE HALLMAN GROUP Scott Hardman, Managing Director, ALEXANDER HUTTON INC.
Jeffrey S. Hussey, Chairman, F5 NETWORKS INC.
Judith M. Jacobsen, Founder, MADISON PARK GREETINGS
Bruce R. Kennedy, Chairman Emeritus, ALASKA AIR GROUP INC., EAC Emeritus
Craig F. Korthase, Senior Vice President and Senior Managing Director, PRIVATE FINANCIAL SERVICES, UPS BANK
Shirley M. Lansing, Founder, GENERAL EMPLOYMENT SERVICES INC.

David R. Laube, Executive In Residence, UNIVERSITY OF COLORADO-DENVER, COLLEGE OF BUSINESS AND ADMINISTRATION
Jack J. Link, President, TRI-LAND CORPORATION
Donald P. Lorentz, Director, retired, ECONOMIC AND TRADE DEVELOPMENT DEPT., PORT OF SEATTLE
Nancy Buffington Lucks, CENTER FOR APPLIED LEARNING, SCHOOL OF BUSINESS AND ECONOMICS, EAC Emerita
Doug Marshall, Senior Vice President, DEPOSIT STRATEGY AND PRODUCT MANAGEMENT, WASHINGTON MUTUAL
D. Douglas McKenna, Psychologist
Jack J. McMillan, Director-Retired, NORDSTROM, EAC Emeritus
Greg Nelson, Product Unit Manager, MICROSOFT FINANCIAL TECHNOLOGIES
Gordon A. Nygard, Executive Director and Treasurer, SEATTLE PACIFIC FOUNDATION
Richard E. Paetzke, President, DICK PAETZKE CREATIVE DIRECTIONS
Barry Rowan, Former CFO, VELOCOM INC., EAC Emeritus
Paul Y. Song, President and CEO, NOETIX CORPORATION
Donald B. Summers, President, THE MERIDIAN CONSULTING GROUP INC.
George E. Toles Jr., Owner, THE TOLES COMPANY INC.
Bruce A. Walker, Chairman, VALCO GRAPHICS INC.
Frederic S. Weiss, President, WEISS-JENKINS PROPERTIES
Robert L. Wiley, Managing Partner, FIDELITY NORTHWEST ASSOCIATES, LLC, EAC Emeritus
James G. Young, President and CEO, SEATTLE STEAM COMPANY

Faculty
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 and 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.
Gary L. K...
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 Science section on page 186 of the Catalog.

### Required Courses for Chemistry B.S. and B.A.

<table>
<thead>
<tr>
<th>Course</th>
<th>B.S.</th>
<th>B.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHM 1211 General Chemistry*</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>CHM 2371 Organic Chemistry</td>
<td>5</td>
<td>5</td>
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<tr>
<td>CHM 2372 Organic Chemistry</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>CHM 2373 Organic Chemistry</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>CHM 3225 Chemical Equilibrium and Analysis</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>CHM 3226 Quantitative and Instrumental Analysis</td>
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<td>5</td>
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<tr>
<td>CHM 3540 Inorganic Chemistry</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>PHY 1121, PHY 1122 and PHY 1123 Physics for Science and Engineering or PHY 1101, PHY 1102 and PHY 1103 General Physics</td>
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<td>15</td>
</tr>
<tr>
<td>CHM 3401 Thermodynamics</td>
<td>4</td>
<td>4–5**</td>
</tr>
<tr>
<td>CHM 3402 Physical Chemistry</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>CHM 3403 Physical Chemistry</td>
<td>4</td>
<td>4</td>
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<tr>
<td>CHM 3460 Physical Chemistry Laboratory</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>CHM 4542 Transition Metals</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CHM 4900 Independent Project or CHM 4940 Internship in Chemistry</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>MAT 1225 and MAT 1226 Calculus</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>MAT 1228 Series and Differential Equations</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>CHM 4899 Capstone–Natural Sciences Seminar</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Chemistry Electives</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>95</strong></td>
<td><strong>75</strong></td>
</tr>
</tbody>
</table>

* Some students may not be required to take this course. For those who do not, a total of 65 credits in CHM courses is still required.

** B.A. students may substitute CHM 3400 Physical Chemistry for Life Sciences (5 credits) for CHM 3401 Thermodynamics (4 credits).

### B.S. in Biochemistry

(95–102 credits; 40–47 upper-division in biology and chemistry)

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.

### Requirements for the Chemistry Minor

(35 credits; 15 upper-division)

CHM 1211 General Chemistry .............................. 5
CHM 2371, 2372 Organic Chemistry ........................ 10
Chemistry courses chosen from at least two of these five areas: organic, inorganic, analytical, physical and biochemistry. * ................................. 20
**Total** .......................................................... 35

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

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106 Chemistry and Biochemistry
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 1211, 2371, 2372, 3225, 3400 and 3540. 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 “Pre-Professional Health Science” section of the Catalog.

Medical Technology. Medical technology students may complete a B.A. or B.S in chemistry with biochemistry, or the B.S. in biochemistry. See “Pre-Professional Health Science” 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 (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 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 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 immuno-globulins 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 ORGANIC QUALITATIVE ANALYSIS (3) Prerequisites: CHM 2373 and 3225. An advanced laboratory course using separation and instrumental techniques to identify unknown organic compounds, including those found in mixtures. Offered alternate years. Attribute: Upper-Division.

CHM 4542 TRANSITION METALS (3) Prerequisites: CHM 2373 and 3540 (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 basis. 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 required. 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
Kevin Bartlett, Assistant Professor of Chemistry; B.S., Wheaton College, 1995; Ph.D., University of Washington, 2001. At SPU since 2002.
Benjamin J. McFarland, Assistant Professor of Biochemistry; B.S., University of Florida, 1996; Ph.D., University of Washington, 2001. At SPU since 2003.
Lyle B. Peter, Professor of Chemistry; Chair of Chemistry and Biochemistry Department; B.S., Seattle Pacific College, 1972; Ph.D., University of Washington, 1979. At SPU since 1979.
Daisy Y. Zhang, Assistant Professor of Chemistry; B.S., Calvin College, 1989; Ph.D., The University of Chicago, 1993. At SPU since 1998.

Classics
See Languages

Common Curriculum
See College of Arts and Sciences

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

William Purcell, Chair, Richard Jackson, Journalism contact, Lorelle Jabs, William Purcell, 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 the 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 68–70 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 ................................................................ 3
Electives .................................................................................. 12
Total .................................................................................. 55

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
COM 3001 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 .................................................. 5
Total .................................................................................. 30

Requirements for the 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
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, co-acting 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 4910. Attributes: Upper-Division; and Writing Course.
**Communication and Journalism**

**COM 3160 CONFLICT MANAGEMENT (3-5)** 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 PERSUASION: SOCIAL INFLUENCE AND RESPONSIBILITY (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 (3)** 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 4889 COMMUNICATION SEMINAR CAPSTONE (1-5)** 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 coursework 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 required. 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 required. 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 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 Time Schedule. May be repeated for credit up to 15 credits. Attribute: Upper-Division.

**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 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 3390 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 3391 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 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 4899 JOURNALISM SEMINAR CAPSTONE (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. Senior. Class open to communication majors. Class not open to freshmen and sophomores.

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 required. 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 required. 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, 1966; M.S., 1988; Ph.D., University of Washington, 1997. At SPU since 2000.


William Purcell, Associate Professor of Communication; Chair of Communication Department; 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.


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**Computer Engineering**

See Engineering

**Computer Science**

Miller Science Learning Center
(206) 281-2140
www.spu.edu/depts/csc/

Michael H. Tindall, Chair, Charles Burris, 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 modem) 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 very 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; 48 upper-division)
(Refer to chart on page 114.)
(Refer to pages 68–70 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 applications.

Requirements for the B.A. in Computer Science Major
(Refer to pages 68–70 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; 45 upper-division)
(Refer to chart on page 114.)
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; 43 upper-division)
(Refer to chart on page 114.)
This option provides a thorough preparation in the topics and applications of computer science.

B.A. – Computer and Information Technology Option
(68 credits plus specialization; 35 upper-division in core)
(Refer to chart on page 114.)
This option combines preparation in the core areas of computer science with an approved CIT specialization. See 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 under 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) ..... 5
Total .................................................................................. 35

Course Descriptions
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 E-MAIL (1) Prerequisite: CSC 1120 or equivalent experience. Explores the following topics: Networks, electronic mail and the Internet; how to get an e-mail account; logging onto and off of a computer; using the full capabilities of e-mail; 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 preparing 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 2221 PROGRAMMING TECHNIQUES (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.

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) Prerequisite: CSC 2221 and 2431. 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 3221 NETCENTRIC COMPUTING (3) Prerequisite: CSC 2221. 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 3780 or CPE 3780 or EE 3780. 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 3780 and EE 3780. Attribute: Upper-Division.

CSC 3890 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 3950 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 required. 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. The course also surveys automated tools for use in software engineering. Course requirements include the design and implementation of a major software project. Course equivalent: CPE 4150. Attribute: Upper-Division. Class open to seniors.

**Computer Science**

“The technology sector is looking for competent computer scientists who can communicate clearly, think critically and act responsibly. Combining the liberal arts and Christian foundations with a computer science major helps prepare students to be that type of professional.”

Elaine Weltz
Computer Science
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<td>MAT 1225 Calculus *</td>
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<tr>
<td>MAT 1226 Calculus</td>
<td>5</td>
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<tr>
<td>MAT 1228 Series and Differential Equations</td>
<td>5</td>
<td>5</td>
<td></td>
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<tr>
<td>MAT 2375 Probability Theory</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>MAT 2376 Applied Statistics</td>
<td>3</td>
<td></td>
<td></td>
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<tr>
<td>MAT 2720 Discrete Mathematics</td>
<td>3</td>
<td></td>
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</tr>
<tr>
<td>PHY 1121, 1122, 1123 Physics</td>
<td>15</td>
<td></td>
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<tr>
<td>EE 1210 Logic System Design</td>
<td>5</td>
<td></td>
<td></td>
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<tr>
<td>EE 3280 Microcontroller System Design</td>
<td>5</td>
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<td></td>
</tr>
<tr>
<td>ECN 2101 Microeconomics *</td>
<td>5</td>
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<td></td>
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<tr>
<td>ACCT 2361 Financial Accounting</td>
<td>5</td>
<td></td>
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<tr>
<td>BUS 3250 Business Finance</td>
<td>5</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>BUS 3541W Marketing and Society or BUS 3614 Organizational Behavior</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer and Information Technology Specialization</td>
<td>Varies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Upper-Division Credits Required</strong></td>
<td>48</td>
<td>43</td>
<td>45</td>
<td>35+ specialization</td>
</tr>
<tr>
<td><strong>Total Credits Required</strong></td>
<td>109</td>
<td>86</td>
<td>88</td>
<td>68+ specialization</td>
</tr>
</tbody>
</table>

* This course fulfills a general education requirement.
CSC 4210 THEORY OF COMPUTATION AND ALGORITHM (4)
Prerequisites: CSC 3430 and either CSC 3750 or CSC 3760 or CPE 3760 or EE 3760. 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.

CSC 4210 COMPILER DESIGN (4)
Prerequisites: CSC 3210 and CSC 4210. 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 3350 or CPE 3350. 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 their application. State-of-the-art super computers are also discussed. 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 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 project in computer science. May be repeated for credit up to 8 credits. Attribute: Upper-Division, and Writing Course. Class open to computer science majors.

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: Instructor. Independent work on a significant project in computer science. Topics and credits may vary between offerings. May be repeated for credit up to 8 credits. Attribute: Upper-Division.

CSC 4949 PROJECT IN COMPUTER SCIENCE (1-5)
Registration approval: Instructor. Independent work on a significant project in computer science. Topics and credits may vary between offerings. 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. Burriss 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.

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.

Education, School of
Peterson Hall
(206) 281-2214
www.spu.edu/depts/soe/

William Rowley, Dean
Lisa Bjork, Suzanne Bond, Rick Eigenbrood, Arthur Ellis, Greg Fritzberg, Ruth Givens, Sharon Hartnett, Cher Igelman, Russ Killingsworth, Frank Kline, Michelle La Rocque, Linda Montgomery, Raymond Myers, William Nagy, Annette Robinson, Christopher Sink, Richard Smith, David Steele, Sharon Young

The mission of the SPU School of Education is as follows: To prepare educators for service and leadership in schools and communities by developing their professional competence and character within a framework of Christian faith and values.

The vision of the SPU School of Education is as follows: To influence the region, the nation and the world through the preparation of educational leaders for public and private schools.

The primary purpose of the undergraduate program in the School of Education is to prepare competent teachers who integrate academic training and Christian faith with professional practice. School of Education programs are accredited by the National Council for Accreditation of Teacher Education (NCATE). Certification programs in the School of Education are also accredited by the Washington State Board of Education and meet residency requirements for Washington state elementary and secondary teaching certificates. The basic certification programs in the School of Education reflect an underlying philosophy and
knowledge base that permeates all courses and field experiences. This knowledge base consists of two elements: (1) the theoretical and philosophical foundations of education drawn from the social and behavioral sciences; and (2) the effective teaching and schooling research of the past decade. The following categories shape the competency base for the residency certification programs at SPU. These categories contain national, state and Seattle Pacific competencies for teachers:

Category I: Establish and maintain a positive student-focused learning environment. Demonstrate sensitivity to human diversity in teaching and relationships with students, parents and the community.

Category II: Design and adapt challenging curriculum that is responsive to students’ cognitive, social and moral development.

Category III: Use effective teaching practices.

Category IV: Use appropriate assessments to monitor and improve instruction.

Category V: Use information on student performance to advise and involve students and families; inform, involve and collaborate with families to support student success.

Category VI: Evaluate effects of a student’s teaching through feedback and reflection. Establish goals for professional improvement.

Category VII: Demonstrate skills, knowledge and attitudes that contribute to professional, ethical behavior.

Overview of Residency Teacher Certification Program

The professional program leading to residency teacher certification at SPU consists of three parts:

1. The Foundations Unit
2. The Methods and Skills Courses
3. The Applications Unit

1. The Foundations Unit, consisting of Professional Quarters One and Two, provides an overview of theory, pedagogy and educational issues along with limited field experiences. (2) The methods and skills courses provide content breadth and depth for teacher preparation. (3) The Applications Unit, consisting of Professional Quarters Three, Four and Five, provide in-depth training in methods courses along with field experiences that culminate in a full-time internship.

Professional Quarters One through Five are sequential and must be taken as such. They do not, however, need to be taken consecutively. Method and skills courses may be completed before, along with and after Professional Quarters One through Three.

Majors for Undergraduate Students

Undergraduate students must complete all the requirements for a bachelor’s degree in addition to the certification program.

Teacher Certification

Elementary Certification. Students pursuing elementary certification may major in any subject area. Some broad field majors specifically available, although not required, for elementary certification are fine and applied arts, language arts, mathematics, general science and social science (see page 121). The elementary family and consumer science major can be found in on page 139 in the FCS section.

Secondary Certification. Students pursuing secondary certification need to work closely with the certification coordinator to make sure all endorsement requirements are being met. Students planning to teach at the secondary level are encouraged, but not required, to receive a supporting endorsement in a second teaching area. Please see the certification coordinator in the School of Education for more information.

K–12 Certification. Some endorsements lead to K–12 certification. These include art, music, physical education and special education. Students obtaining a K–12 endorsement in art, music or physical education will complete one quarter of internship at the elementary level and another quarter of internship at the secondary level.

Transfer Students

All transfer students are required to take the entire certification program at SPU. Any exceptions must be approved through substitution and petition processes in the School of Education. If substitutions and petitions are granted, a minimum of 26 credits, including the internship, must be completed as a regularly enrolled student at SPU.

Upon arrival at SPU and prior to registration, transfer students should meet with the certification coordinator regarding course substitution requirements and procedures.

Post-Baccalaureates

Students pursuing certification after receiving a bachelor’s degree from an accredited institution recognized by the state of Washington do not have to earn a second degree. However, they must still meet state requirements for an endorsement and be approved by the School of Education.

Advising

To complete the residency certification program in a timely manner, students need competent academic advice. The School of Education provides group and individual sessions with the certification coordinator to answer questions and help with the certification process. As soon as a student identifies a desire to be a teacher, he or she should make arrangements to attend a group session or make an appointment for advising by calling (206) 281-2214.

Admission to the School of Education

A student enrolling in Professional Quarter One is considered a tentative candidate for admission to the School of Education. During Professional Quarter Two, the student is asked to prepare a formal application for full admission to the School of Education, which will be...
considered only upon satisfactory completion of Professional Quarter Two. The student may continue the sequence of Applications Unit courses (Professional Quarters Three, Four and Five) upon full admission to the School of Education and fulfillment of the prerequisites to the appropriate professional quarters.

To achieve admission to the School of Education, a candidate must do the following:

1. Complete the Foundations Unit (Professional Quarters One and Two), achieving a “B” average (with no grade lower than a “C”), and a grade of “B” or better in EDU 3105. The Foundations experience must be no more than five years old.
2. Receive a favorable recommendation from the Foundations team.
3. Achieve a cumulative GPA of 3.0 or a 3.3 GPA in the last 45 credits of college or university work.
4. Receive passing scores on all three sections of the Washington Educator Skills Test-Basic (WEST-B). (This test must be taken prior to Professional Quarter Two.)
5. File a formal application for admission to the School of Education.

Registration
Most classes in the certification program require School of Education permission to register. Before registering, students must go to the School of Education office to fill out any necessary paperwork and confirm appropriate prerequisites have been passed. No appointment is necessary for this process.

Certification
Upon successful completion of the residency certification program, the Seattle Pacific University School of Education recommends candidates to the state of Washington for teacher certification. Though SPU makes recommendations to the state, it is the state that issues the certificate not the School of Education. All teacher certification candidates are subject to Washington requirements for the residency teaching certificate. These requirements may be changed by the state and override anything stated in the Catalog. Please see the education office for updates on state requirements.

Internship Placement and Supervision Policy
Students anticipating teaching internships should be aware of the School of Education school-site placement policy:

1. Internship sites will be selected from districts within 50 miles of Seattle Pacific University that have contractual internship agreements with SPU. In an effort to facilitate supervision, attempts will be made to place groups of interns near each other.
2. Interns will be placed in settings that are new to them in an effort to broaden their school experience. Schools where interns have been students, or parents of students, volunteers, aides or coaches will not generally be considered.
3. Since internships must be arranged in cooperation with school personnel, the School of Education cannot guarantee that an internship will be provided in a certain quarter. Every attempt will be made to assign students to their preferred quarters as space permits.
4. Internships not directly supervised by SPU School of Education faculty will not be provided.

Internship Professional Expectations
1. Interns will be responsible for filing written notification of any changes in their internship plans at least five weeks prior to the first quarter of the scheduled internship. Failing to do so may jeopardize placement.
2. It is strongly recommended that students not be employed during Professional Quarters Four and Five because of the time and professional demands of the internship program. In addition, students may not enroll in courses other than the requirements of Professional Quarters Four and Five.
3. Interns are expected to provide their own transportation to the internship school sites.

Moral Character and Personal Fitness Policy
Teacher certification programs at SPU include experiences working closely with children in public and private schools. The protection of children is a paramount concern. Consequently, the School of Education reserves the right to refuse placement of any SPU student in any field experience. Any SPU student registering for any School of Education course that involves working with children does so with the following understanding:

1. Admission to the course and subsequent placement with children may be denied if fitness for such a placement is questionable in the exclusive judgment of the University.
2. The student may be required to withdraw from the course, practicum experience or the certification program should the School of Education receive information during the course of a practicum placement that raises a concern about the fitness of the person to work with children.
3. Information received about the fitness of the student working with children may be shared with the school district to determine if a placement can and should be made or continued.
4. Ultimately, the SPU School of Education cannot override school districts, and practicum placements are dependent on school district cooperation and subject to school district approval.
5. Denial of, or removal from, a practicum setting due to lack of fitness to work with children will result in a denial of admission to the teacher education program or in being dropped from a program if a student has already been admitted.
6. In addition to satisfying the requirements of SPU, in order to receive certification, good moral character and personal fitness must be established by each student with Washington state’s Office of the Superintendent of Public Instruction, Office of Professional Practice.
## Professional Quarter Sequence
### Foundations Unit: Elementary, Secondary and K–12

<table>
<thead>
<tr>
<th>Professional Quarter (PQ)</th>
<th>Prerequisites</th>
<th>Classes/Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PQ One</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary Secondary and K–12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Be officially admitted to SPU.</td>
<td></td>
<td>• EDU 2103 Foundations of American</td>
</tr>
<tr>
<td>• Be of at least sophomore standing (45 credits).</td>
<td></td>
<td>• EDTC 2235 Intro to Educational Technology/2 cr.</td>
</tr>
<tr>
<td>• Have cumulative GPA of 2.8 or have GPA of 3.0 in the last 30 credits.</td>
<td></td>
<td>(Must be taken concurrently.)</td>
</tr>
<tr>
<td>• Start a file in the School of Education; please contact the education office to receive the appropriate paperwork.</td>
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<td></td>
</tr>
</tbody>
</table>

| **PQ Two**                |               |                |
| Elementary Secondary and K–12 |               |                |
| • Successful completion of PQ One. |                | • EDU 3102 Applications of Educational Psychology/2 cr. |
| • Be of at least junior standing (90 credits). |                | • EDU 3104 Foundations of Multicultural Education/2 cr. |
| • Maintain GPA requirement for PQ One. |                | • EDSP 3107 Exceptionality in the Classroom/2-3 cr. |
| • Complete an approved general psychology or general sociology class with a grade of “C” or better. |                | • EDU 3105 Lab Experience/3 cr. (A grade of “B” or better is required.) |
| • Take all three sections of the WEST-B. |                | (Must be taken concurrently.) |

| September Experience |               | • EDU 3942 September Experience/1 cr. |
|                      | Successful completion of PQ Two. | (September Experience should be taken the September following Professional Quarter Two.) |

### Applications Unit: Elementary

<table>
<thead>
<tr>
<th>Professional Quarter (PQ)</th>
<th>Prerequisites</th>
<th>Classes/Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PQ Three</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Successful completion of PQ Two.</td>
<td></td>
<td>• EDSC 4234 Science Methods: Elementary Emphasis/3 cr.</td>
</tr>
<tr>
<td>• Completion of MAT 2530 and MAT 2531 with a grade of “C” or better.</td>
<td></td>
<td>• EDMA 4232 Mathematics Methods: Elementary Emphasis/3 cr.</td>
</tr>
<tr>
<td>• Completion of a college-level science course.</td>
<td></td>
<td>• EDU 3542 Field Experience: Elementary Math and Science/2 cr.</td>
</tr>
<tr>
<td>• Maintain a 3.0 GPA following PQ Two.</td>
<td></td>
<td>(Must be taken concurrently.)</td>
</tr>
<tr>
<td>• Achieve formal admission status to the School of Education.</td>
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</tr>
<tr>
<td>• Receive passing scores on all three sections of the WEST-B.</td>
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</tbody>
</table>

| **PQ Four**               |               |                |
| Elementary                |               |                |
| • Successful completion of PQ Three. |                | • EDU 4230 Elementary General Methods/2 cr. |
| • Completion of LIN 2100 and EDRD 3529 with a grade of “C” or better. |                | • EDU 4231 Reading, Language Arts Methods/3 cr. |
| • Complete at least 15 upper-division credits in major. |                | • EDU 4233 Social Studies Methods: Elementary Emphasis/3 cr. |
| • Participate in an internship placement interview with the elementary internship coordinator. |                | • EDU 4941 Elementary Internship A /10 cr. (A grade of “B” or better is required.) |
| • Receive fingerprint clearance. |                | (Must be taken concurrently.) |
| • Achieve senior standing (135 credits). |                |                |

| **PQ Five**               |               |                |
| Elementary                |               |                |
| • Successful completion of PQ Four. |                | • EDU 4942 Elementary Internship B /16 cr. (A grade of “B” or better is required.) |
| • EDU 4800 Teacher As Person/2cr. |                | (Must be taken concurrently.) |

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“I believe teaching is a redemptive act. I think of it as love in action. The best teachers engage their students and create possibilities for their lives. This is how I define service.”

Sharon Hartnett
Education
### Professional Quarter Sequence, cont.

#### Applications Unit: Secondary

<table>
<thead>
<tr>
<th>Professional Quarter (PQ)</th>
<th>Prerequisites</th>
<th>Classes/Credits</th>
</tr>
</thead>
</table>
| PQ Three Secondary        | • Successful completion of PQ Two.  
                          • Maintain a 3.0 GPA following PQ Two.  
                          • Achieve formal admission status to the School of Education.  
                          • Receive passing scores on all three sections of the WEST-B. | • EDU 4240 General Methods: Teaching Secondary/4cr.  
                          • EDU 4530 Topics in Secondary Education/2 cr. |
| PQ Four Secondary         | • Successful completion of PQ Three.  
                          • Complete at least 15 upper-division credits in major.  
                          • Get written recommendations from two SPU professors in major.  
                          • Participate in an internship-placement interview with the secondary internship coordinator.  
                          • Receive fingerprint clearance.  
                          • Achieve senior standing (135 credits). | • EDU 4945 Secondary School Internship A/17 cr.  
                          • EDU 4845 Secondary Student Teaching Seminar/1 cr. |
| PQ Five Secondary         | • Successful completion of PQ Four. | • EDU 4946 Secondary School Internship B/16 cr.  
                          • (A grade of “B” or better is required)  
                          • EDU 4800 Teacher As Person/2cr.  
                          • (Must be taken concurrently.) |

#### Applications Unit: Art, Music and P.E. (K–12)

<table>
<thead>
<tr>
<th>Professional Quarter (PQ)</th>
<th>Prerequisites</th>
<th>Classes/Credits</th>
</tr>
</thead>
</table>
| PQ Three K–12             | • Successful completion of PQ Two.  
                          • Achieve formal admission status to the School of Education  
                          • Receive passing scores on all three sections of the WEST-B. | • EDU 4240 General Methods: Teaching Secondary/4cr.  
                          • EDU 4530 Topics in Secondary Education/2 cr.  
                          • (Must be taken concurrently.) |
| PQ Four K–12              | • Successful completion of PQ 3.  
                          • Complete at least 15 upper-division credits in major.  
                          • Participate in an internship placement interview with the elementary and secondary internship coordinators.  
                          • Receive fingerprint clearance.  
                          • Achieve senior standing (135 credits). | • EDU 4230 Elementary General Methods/2 cr.  
                          • EDU 494X Elementary Internship: (Art, Music or PE) /16 cr.  
                          • (Must be taken concurrently.) |
| PQ Five K–12              | • Successful completion of PQ Four. | • EDU 4945 Secondary School Internship A/16 cr.  
                          • EDU 4800 Teacher As Person/2cr.  
                          • (Must be taken concurrently.) |
Elementary Methods and Skills Courses
Students pursuing elementary certification will complete, in addition to an academic major and the five professional quarters, elementary methods and skills courses. These courses provide breadth and depth in several content areas. Students must earn a grade of "C" or better in each of the methods and skills courses to be recommended for certification. In order to avoid taking extra classes, elementary certification students should use these courses to satisfy general education requirements as listed below.

<table>
<thead>
<tr>
<th>Class/Credits</th>
<th>Meets Exploratory Curriculum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choose One:</td>
<td></td>
</tr>
<tr>
<td>ART 3546 Art Education (3) or MUS 3501 Elementary Methods and Materials (3) or TRE 3800 Theatre Education Methods (3)</td>
<td>Arts and Humanities A</td>
</tr>
<tr>
<td>Choose One:</td>
<td></td>
</tr>
<tr>
<td>PES 3510 Teaching PE (4) or * PES 2555 Community Health (5)</td>
<td></td>
</tr>
<tr>
<td>Any college science course (3–5)</td>
<td>Natural Sciences; if the course is selected from those approved for the Exploratory Curriculum</td>
</tr>
<tr>
<td>MAT 2530 Survey or Mathematics (3) and MAT 2531 Survey of Mathematics II (3)</td>
<td>Mathematics (Only for teacher certification students.)</td>
</tr>
<tr>
<td>Choose One:</td>
<td></td>
</tr>
<tr>
<td>EDRD 4516 Children’s Literature (3) or EDRD 4517 Young Adult Literature (3)</td>
<td>Arts and Humanities B</td>
</tr>
<tr>
<td>** LIN 2100 Foundations of Language Study (3)</td>
<td>Arts and Humanities B</td>
</tr>
<tr>
<td>** EDRD 3529 Child Language Development and the Reading Process (3)</td>
<td></td>
</tr>
</tbody>
</table>

* The prerequisite to PES 2555 is waived for education students.
** LIN 2100 is a prerequisite to EDRD 3529.

Secondary Methods Courses
Students preparing for secondary certification will complete, in addition to an academic major and the five professional quarters, secondary methods courses. The student chooses the appropriate methods course(s) from the following list according to his or her primary endorsement. If a student is pursuing more than one endorsement, the appropriate methods course(s) must be taken for each endorsement area, this includes both primary and supporting endorsements. Methods course(s) will be accompanied by a 1-credit field experience to be taken concurrently. It is strongly suggested that the methods courses be taken just before Professional Quarter Four if possible.

<table>
<thead>
<tr>
<th>Endorsement and Classes/Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art:</td>
</tr>
<tr>
<td>ART 3546 Art Education (3)</td>
</tr>
<tr>
<td>*English and English-Language Arts:</td>
</tr>
<tr>
<td>EDU 3361 Secondary English Methods (3)</td>
</tr>
<tr>
<td>Family and Consumer Science:</td>
</tr>
<tr>
<td>FCS 4511 Curriculum and Evaluation in FCS Education (3)</td>
</tr>
<tr>
<td>Foreign Languages (French, German or Spanish):</td>
</tr>
<tr>
<td>**LIN 2100 Foundations of Language Study (5)</td>
</tr>
<tr>
<td>LIN 4365 Methods of Foreign Language Teaching (3)</td>
</tr>
<tr>
<td>*History or Social Studies:</td>
</tr>
<tr>
<td>EDU 4364 Teaching Secondary Social Studies (3)</td>
</tr>
<tr>
<td>*Mathematics:</td>
</tr>
<tr>
<td>EDMA 3357 Teaching Secondary Mathematics (3)</td>
</tr>
<tr>
<td>Music:</td>
</tr>
<tr>
<td>MUS 3503 General Music Methods (3)</td>
</tr>
<tr>
<td>MUS 3504 Choral Music Methods (3)</td>
</tr>
<tr>
<td>MUS 3505 Instrumental Music Methods (3)</td>
</tr>
<tr>
<td>Physical Education:</td>
</tr>
<tr>
<td>PES 3510 Teaching Physical Education (4)</td>
</tr>
<tr>
<td>*Science (Biology, Chemistry, Physics or Earth Science):</td>
</tr>
<tr>
<td>EDSC 3359 Teaching Secondary Science (3)</td>
</tr>
</tbody>
</table>

*The prerequisite to these courses is successful completion of Professional Quarters One and Two.
**This course meets the Arts and Humanities B category in the Exploratory Curriculum.

Majors for Elementary Teachers
To be admitted to these broad field majors, students must meet the admission requirements of both the School of Education and the appropriate school or department in which the courses are offered. For initial advising, contact the School of Education certification coordinator. The majors listed below are designed for students who are seeking elementary certification:
Fine and Applied Arts
Andrew Ryder, Advisor, Theatre Department
(66 credits, 23 upper-division)

Visual Arts (22 credits)
- ART 1180 The Visual Arts ............................................. 5
- ART 1102 Drawing Studio ........................................... 3
- or ART 1103 Drawing Studio ........................................ 3
- ART 1202 Design Studio ............................................. 3
- ART 3604 History of Renaissance Art (5)
- or ART 3605 History of Modern Art (5) .................. 5

Select two courses from the following:
- ART 2422 Metal Studio (3)
- ART 2428 Ceramics Studio (3)
- ART 3315 Painting Studio—Watercolor (3) .......... 6

Communication/Integration (10 credits)
- COM 4323 Performing Literature ................................. 5
- FCS 1710 Design Fundamentals .................................. 5

Music (15 credits)
- MUS 1101 Musicianship ............................................. 5

Select two or more courses
from the following to total ..................................... 4
- MUS 1250 Beginning Keyboard (2)
- MUS 1251 Intermediate Keyboard (2)
- MUS 1260 Beginning Voice (2)
- MUS 1261 Advanced Voice (2)
- MUS 1270 Beginning Folk Guitar (1)
- MUS 1271 Intermediate Folk Guitar (1)

Music Electives (see electives below) to total .......... 6

Theatre (18–19 credits)
- TRE 1110 The Theatre Experience (5) .............. 5
- TRE 1310 The Actor’s Art (5) (TRE 1340 Acting One (5)
math may be substituted if absolutely necessary) .................. 5

Select one course from the following to total .......... 3
- TRE 2320 Stage Movement (3)
- TRE 3321 Elements of Mime (3)
- TRE 3720 Stage Makeup (3)
- TRE 4770 Creative Dramatics (3)

Choose an option below to total ......................... 5 or 6
a) Two more of the 3-credit courses listed above (6) or
b) TRE 3710 Play Directing (5)

Approved Electives to complete 66 credits
(including 23 upper-division):
- MUS 1102 and 1103 Musicianship (5 each)
- MUS 2605 Popular Music (5)
- MUS 3502 Music for Special Ed. (3)
- MUS 3602 Magic of Opera (5)
- MUS 4401 The Song of the Church (3)
- MUS 4402 History and Appreciation of Jazz (5) W
- MUS 4654/4655/4656 Context Studies (3 ea.)
- Any upper-division SPU Ensemble (1 ea.)
- ART 2203 Painting Studio—Oil (3)
- ART 3421 Printmaking Studio—Advanced 1 (3)
- FCS 3870 History of Costume (5) W

Approved electives to complete 66 credits include
those listed above, or other approved electives in art,
music, theatre and family consumer sciences.

Note: Fine and applied arts majors need to plan
carefully so as to meet the University “W” requirement for graduation.

Language Arts
Luke Reinsma, Advisor, English Department
(50–53 credits, 23 upper-division)

COM 1101 Introduction to
Interpersonal Communication ................................ 5
- COM 4323 Performing Literature ................................. 5
- EDRD 4516 Children’s Literature ................................. 3
- EDRD 4517 Young Adult Literature .............................. 3
- ENG 2253 American Literature: Beginnings to 1900 ........ 5
- ENG 3180 Advanced Grammar .................................. 3
- ENG 3334 American Ethnic Literature ........................ 5
- LIN 2100 Foundations of Language Study .................. 5

Select two courses from the following:
- ENG 2248 New International Fiction (5)
- ENG 2251 English Literature: Beginnings Through Milton (5)
- ENG 2252 English Literature: Restoration Through Victorian (5)
- ENG 3246 World Literature (5) W
- EUR 3287 Mythology in Literature (5) W ............. 10

Select two courses from the following:
- ENG 2201 Intermediate Writing (3)
- ENG 2215 Imaginative Writing (3)
- ENG 3301 Advanced Expository Writing (3) W
- ENG 3318 Creative Nonfiction (3) W ..................... 6

Select one of the following:
- TRE 1310 The Actor’s Art (5)
- TRE 1340 Acting I (5)
- TRE 1720 Stagecraft (5)
- TRE 1931/3931 Production Practicum (2)
- TRE 4770 Creative Dramatics (3) ......................... 2–5

Total ................................................................. 50–53

Students choosing the language arts major must fulfill
the requirement for proficiency in a second language. The
requirement, equal to the completion of the third quarter of
a University-level language course, may be met by the
study of any modern or classical language.

Note: Language arts majors need to plan carefully so
as to meet the University “W” requirement for graduation.

Mathematics
Sharon Young, Advisor, Mathematics Department
(52 credits, 23 upper-division)

MAT 1225 (5) and MAT 1226 Calculus (5) ..................... 10
- MAT 1360 Intro to Statistics ........................................ 5
- MAT 1521 Intro to Contemporary Mathematics (5)
- or MAT 1228 Series and Differential Equations (5) .... 5
- MAT 2401 Linear Algebra ........................................... 3
- MAT 2530 (3) and MAT 2531 (2)
- Survey of Mathematics I and II ................................. 5

Select 3 or more credits of
computer science courses ................................. 3

EDMA 4232 Mathematics Methods:
Elementary Emphasis ........................................... 3
- MAT 4610 The Evolution of Mathematical Thought ........ 3
- MAT 4930 Practicum in Mathematics ...................... 1
- MAT 4918 Senior Seminar ........................................ 3

Electives (upper-division) ....................................... 8

Total ................................................................. 52
Approved electives to complete 52 credits: EDMA 3757, MAT 3401, MAT 3441, MAT 3443, MAT 3749, MAT 4402 (W), MAT 4910, MAT 4930; a maximum of 2 credits in MAT 4930 may be applied.

Note: Mathematics majors need to plan carefully so as to meet the University "W" requirement for graduation.

General Science
Ray Myers, Advisor, School of Education
(60 credits, 15 upper-division)
Students need 10–15 credits in each of four natural science divisions: biology, chemistry, earth sciences and physics/astronomy. Recommended courses are the following:

Biology
BIO 2101, 2102, 2103 ........................................................... 15
Chemistry
CHM 1211 and 1330 or 2371 .................................................... 10
Students interested in taking additional chemistry should take CHM 2371
Earth Science
PHY 1150 and EDSC 4566 ................................................... 10
Physics PHY 1110 and PHY 1135 ....................................... 10
Disciplinary emphasis (required to select one area: biology, chemistry or physics) ........................................ 15 upper-division

Biological Emphasis
Choose 15 credits from BIO 3310, 3325, 3351, 3453, 4330, 4615, 4950
Chemistry Emphasis
Choose 15 credits from CHM 3225, 3400, 3540, 4361
Physics Emphasis
Choose 15 credits from PHY 3120 (W), 3311, 4242, 4243
Total ..................................................................................... 60

Note: General science majors need to plan carefully so as to meet the University "W" requirement for graduation.

Social Science
Donald Holsinger, Advisor, History Department
(61-65 credits, 23 upper-division)
HIS 2502 The United States to 1876 (5)
or HIS 3501 Colonial and Revolutionary America (W) (5) .... 5
HIS 2503 The United States Since 1876 ......................... 5
Non-American History (upper-division recommended) .... 5
Upper-division History elective ................................. 5
HIS 3600 History of the Pacific Northwest ................. 5
Select one course from the following:
ECN 1100 Fundamentals of Economics (5)
ECN 2101 Principles of Microeconomic (5)
ECN 2102 Principles of Macroeconomics (5)
GEO 2207 Economic Geography (5) ......................... 5
GEO 1110 World Regional Geography ...................... 5
POL 1120 American Government and Politics .......... 5
PSY 1180 General Psychology ................................. 5
SOC 1110 Introduction to Sociology ....................... 5
One course in Cultural Anthropology ...................... 3–5
Two upper-division elective courses from the following disciplines: ANT, GEO, POL, PSY or SO ................ 8–10
Total ..................................................................................... 61–65

Note: Social Science majors need to plan carefully so as to meet the University "W" requirement for graduation.

Special Education (K–12)
The primary purpose of the special education major is to develop teachers who have the knowledge and skills necessary to design and implement appropriate education for students with disabilities. The emphasis in this program is on students with special needs in the areas of learning and behavior.

While not required, it is strongly recommended that the teacher candidate complete both the regular certification program (at either the elementary or secondary level), and the special education major. Students completing regular and special education certification follow the same Foundation courses, Methods and Skills Courses, and Applications Unit courses as regular education certification students, but have an additional quarter of internship in a special education setting. The additional internship will give the candidate experience in the regular classroom as well as in the special education setting. For general requirements and admission policies see the listings for relevant quarters on previous pages.

Admission to the Special Education Major
Students who are interested in the special education certification program are encouraged to indicate their intent upon their arrival at SPU. This indication is made with the School of Education in Peterson Hall. It does not commit the student to the program, but it assures advising and continuing receipt of current information about the special education program requirements. Admission to the special education major requires completion of Professional Quarter One.

Requirements for the Special Education Major
(45 credits)
EDSP 3107 Exceptionality in the Classroom .................... 3
PSY 2470 Life Span Developmental Psychology .......... 5
EDRD 3529 Child Language Development and the Reading Process ................................. 3
EDSP 4642 Instructional Strategies for the Exceptional Student ................................. 3
EDSP 4646 Severe Disabilities ........................................ 3
EDSP 4648 Teaching Students With Behavior Disorders ........................................ 3
EDSP 4651 Special Education Assessment ...................... 3
EDSP 4652 Learning Disabilities .................................. 3
EDSP 4653 Teaching Reading to Exceptional Students (W) ........................................ 3
EDSP 4657 Behavior Management: Applied Behavioral Analysis ........................................ 3
EDSP 4658 Senior Seminar: Issues in Special Education (W) ........................................ 3
EDSP 4943 Elementary or EDSP 4948 Secondary Special Internship ........................................ 10–18
Total ..................................................................................... 45–53
Requirements leading to certification in special education at SPU:

1. Certification in special education (grades K–12) is granted upon successful completion of the special education major and the specialized certificate requirements.

2. Foundations requirements for a K–12 special education certificate are listed earlier in the School of Education Foundations Units of this Catalog. Specific applications courses are required for the K–12 special education certificate. In addition to the required internship of the major, the Applications Unit requires a second quarter of internship in special education.

3. Transfer students must complete a minimum of 15 upper-division credits in special education coursework prior to the internship.

K–12 Special Education Only Certification

Students pursuing only their K–12 Special Education Certification will take Professional Quarters One and Two along with the certification students. In addition, students will take Methods and Skills Courses and complete their Applications Unit in either elementary or secondary levels depending on their desired emphasis, as listed below.

Methods and Skills Courses

Elementary Required
MAT 2530 Survey of Math I.................................................. 3
MAT 2531 Survey of Math II.................................................. 2

Elective Elementary
Minimum of two courses and 5–7 credits.
ART 3546 (3), EDSC 4234 (3), EDU 4233 (3), MUS 3500 (2), MUS 3502 (3), PE 3510 (4).

Secondary Required
EDU 4240 General Methods for Teaching in Secondary Schools .................................................. 5

EDRD 4530 Topics in Secondary Education ..................... 2

Secondary Electives
Minimum of two courses and 6 credits.
EDMA 3357 (3), EDSC 3359 (3), EDU 4364 (3), EDU 3361 (3), FCS 4511 (3), ART 3547 (3), PE 3515 (3),
Or one of the music methods courses — MUS 3503 (3), MUS 3504 (3), MUS 3505 (3)

Applications Unit

Elementary Required
EDU 4230 Elementary General Methods: Theory Into Practice .................................................. 2
EDMA 4232 Mathematics Methods:
Elementary Emphasis .................................................. 3
EDSP 4943 Elementary Special Education
Internship A* ................................................................. 9
EDSP 4944 Elementary Special Education
Education Internship B .................................................. 17

OR
Secondary Required
EDSP 4948 Secondary Special Education
Internship A* ................................................................. 18

EDSP 4949 Secondary Special Education
Internship B ................................................................. 18

*EDSP 4943 or EDSP 4948 will fulfill the internship requirement of the major.

Math Education

EDMA 3357 TEACHING SECONDARY MATHEMATICS (3)
Prerequisite: Admission to School of Education. Overviews content and strategies appropriate to the teaching of secondary school mathematics. Attention is given to the NCTM standards and Washington State Essential Academic Learning Requirements. Emphasis is also placed on problem solving. Recommended prior to or concurrent with first-quarter internship. Corequisite: EDU 3557. Attribute: Upper-Division. Class not open to freshmen and sophomores.

EDMA 4232 MATHEMATICS METHODS: ELEMENTARY
EMPHASIS (3) Registration approval: School of Education. Prerequisites: Admission to School of Education and EDMA 2530, 2531. Explores contemporary methods and trends in the teaching of mathematics in elementary school emphasizing learning theories, changes in the mathematical content, use of technology and pedagogy. Attention is given to the NCTM standards and to Washington State Essential Academic Learning Requirements. Corequisites: EDSC 4234 and EDU 3542. Attribute: Upper-Division. Class not open to freshmen and sophomores.

Reading Education

EDRD 3529 CHILD LANGUAGE DEVELOPMENT AND THE

EDRD 4231 READING AND LANGUAGE ARTS METHODS (3)
Registration approval: School of Education. Prerequisites: EDRD 3529, LIN 2100, and admission to the School of Education. Incorporates a variety of instructional strategies, formats and media to present a variety of methods and strategies for teaching, integrating and assessing the processes of reading, writing and oral language in the elementary classroom; and analysis and uses of language arts materials. Corequisites: EDU 4230, EDU 4233 and EDU 4941. Attribute: Upper-Division. Class not open to freshmen, sophomores and juniors.

EDRD 4516 CHILDREN'S LITERATURE (3) Prerequisite: ENG 1110 or equivalent. Examines the variety and richness of literature available for children in preschool through eighth grade; presents major genres and notable authors and illustrators; and develops familiarity with varied responses to literature adaptable for classroom use. Attribute: Upper-Division. Class not open to freshmen.

EDRD 4517 YOUNG ADULT LITERATURE (3) A study of young-adult literature, including intensive reading in the best of this literature and application of both critical and pedagogical strategies to the reading. Attribute: Upper-Division.

EDRD 4530 READING AND WRITING ACROSS THE CURRICULUM (2) Prerequisite: Completion of Professional Quarter 1 One and Two. Provides a functional approach to content-centered instruction that will prepare preservice teachers to teach content, reading and writing skills simultaneously. Emphasis is placed on the application of skills that middle, junior and senior high school readers must make to learn content from a variety of sources and materials. Attribute: Upper-Division. Class not open to freshmen and sophomores.

Science Education

EDSC 3359 TEACHING SECONDARY SCIENCE (3) Prerequisite: Admission to School of Education. Designed to assist students in relating their understanding in various science disciplines to the practical problems of planning and implementing learning experiences for secondary students. The emphasis is on the use of inquiry/problem solving approaches to science learning. Corequisites: EDU 3559. Attribute: Upper-Division. Class not open to freshmen and sophomores.
EDSC 4234 SCIENCE METHODS: ELEMENTARY EMPHASIS (3) Registration approval: School of Education. Prerequisite: Admission to School of Education. Briefly surveys current elementary science programs and examines techniques and materials using a discovery approach to teach some basic principles of science. Corequisite: EDU 3542. Attributes: Upper-Division. Class not open to freshmen and sophomores.

EDSC 4527 NATURE OF ELEMENTARY SCHOOL SCIENCE (3) Introduces science teaching strategies and processes of science (hypothesizing, designing experiments, etc.) using class activities from modern elementary science curricula. Attribute: Upper-Division.

EDSC 4566 ENVIRONMENTAL EDUCATION FOR TEACHERS– OCEANOGRAPHY AND METEOROLOGY (5) Prerequisites: CHM 1110 or PHY 1110, BIO 1100 or higher, and PHY 1150 or permission of instructor. Gives ideas for outdoor activities, classroom activities, field trips, regional environmental resources, readings, teaching strategies and discussions. Attribute: Upper-Division. Class not open to freshmen.

Special Education

EDSP 3107 EXCEPTIONALITY IN THE CLASSROOM (2-3) Registration approval: School of Education. Prerequisite: Professional Quarter One. Examines the concept of difference, including influences of exceptionality on social and psychological roles. Presents strategies for inclusion of exceptional children in classrooms. Corequisites: EDU 3102, EDU 3104 and EDU 3105. Attribute: Upper-Division. Class not open to freshmen and sophomores.

EDSP 4642 INDIVIDUAL EDUCATION PROGRAMS (3) Registration approval: School of Education. Prerequisite: EDSP 3107. Classroom presentation centers around the interaction of the disabled child with the school. Topics include federal and state regulations for the education of the disabled; procedures for referral, diagnosis and placement; formation of individual education programs, service models, task analysis and sequencing of skills, formation and evaluation of behavioral objectives; selection of instructional materials and methodology; and classroom organization. (Pre-service emphasis.) Attribute: Upper-Division. Class not open to freshmen and sophomores.

EDSP 4645 PSYCHOLOGY OF THE GIFTED INDIVIDUAL (3) Registration approval: School of Education. Prerequisite: EDSP 3107. Introduces identification of gifted and creative individuals and development of educational programs and resources for the gifted. Attribute: Upper-Division. Class not open to freshmen and sophomores.

EDSP 4646 SEVERE DISABILITIES (3) Registration approval: School of Education. Prerequisite: EDSP 3107. Explores the issues surrounding the education of the developmentally disabled person. Includes definitions and classification systems, etiology, theoretical approaches, strategies for educational diagnosis and intervention, family problems and other issues. Attribute: Upper-Division. Class not open to freshmen and sophomores.

EDSP 4648 TEACHING STUDENTS WITH EMOTIONAL AND BEHAVIOR DISORDERS (3) Registration approval: School of Education. Prerequisite: EDSP 3107. Provides special educators with knowledge related to characteristics and inclusion strategies for children and youth with behavior disorders or emotional disturbance. Attributes: Special Ed-Instructor methods; and Upper-Division. Class not open to freshmen and sophomores.

EDSP 4651 SPECIAL EDUCATION ASSESSMENT (3) Registration approval: School of Education. Prerequisite: EDSP 3107. Teaches diagnostic and evaluative procedures commonly used with exceptional children. Includes construction of criterion referenced tests and curriculum based assessment; use and interpretation of formal and informal tests, and procedures and related ethics procedures, and related issues. Attributes: Special Ed-Assessment and evaluation; and Upper-Division. Class not open to freshmen and sophomores.

EDSP 4652 DISABILITIES OF LEARNING AND ATTENTION (3) Registration approval: School of Education. Attributes: Special Ed-Alt delivery and strategy; and Special Ed-Instruction methods. Class not open to freshmen and sophomores.

EDSP 4653 TEACHING READING TO EXCEPTIONAL STUDENTS (3) Registration approval: School of Education. Prerequisites: EDSP 3107 and EDSP 3107 or permission of instructor. Focuses on diagnosis of reading strengths and weaknesses; correlates of reading problems; and analysis and selection of methods and materials for reading instruction of special needs children, including children who speak English as their second language. Attributes: Upper-Division; and Writing Course. Class not open to freshmen and sophomores.

EDSP 4654 BEHAVIOR MANAGEMENT (3) Registration approval: School of Education. Prerequisite: EDSP 3107. Focuses on an in-depth explanation of applied behavior analysis and classroom management strategies useful in meeting the needs of children and youth with behavioral disabilities. Attribute: Upper-Division. Class not open to freshmen and sophomores.

EDSP 4657 ISSUES IN SPECIAL EDUCATION (3) Registration approval: School of Education. Prerequisite: EDSP 3107. Explores major trends and issues affecting special education, including the rights of the disabled, emerging trends in educational services and major issues surrounding the quality of life of disabled individuals. Open to special education majors only. Attributes: Upper-Division; and Writing Course.

EDSP 4890 INDEPENDENT STUDY (1-5) Registration approval: Independent Study Agreement. Prerequisites: EDSP 3107. May be repeated for credit up to 5 credits. Attribute: Upper-Division.

EDSP 4943 ELEMENTARY SPECIAL EDUCATION INTERNSHIP A (1-17) Registration approval: School of Education. Prerequisites: Same as for EDU 4941. First quarter of a two-quarter internship. Observation and daily teaching in special education in the elementary schools under the direction of a cooperating teacher. Extra fee. May be repeated for credit up to 17 credits. Attribute: Upper-Division. Class not open to freshmen, sophomores and juniors.

EDSP 4944 ELEMENTARY SPECIAL EDUCATION INTERNSHIP B (1-17) Registration approval: School of Education. Prerequisites: Same as for EDU 4941. Second quarter of a two-quarter internship. Observation and daily teaching in special education in the elementary schools under the direction of a cooperating teacher. Extra fee. May be repeated for credit up to 17 credits. Attribute: Upper-Division. Class not open to freshmen, sophomores and juniors.

EDSP 4948 SECONDARY SPECIAL EDUCATION INTERNSHIP A (1-17) Registration approval: School of Education. Prerequisites: See Professional Quarters Four and Five secondary program prerequisites. Three-quarter internship (two in special education; one in regular education). Provides opportunity for observation and daily teaching in special education sections in the public schools under the direction of a master teacher. Extra fee. May be repeated for credit up to 17 credits. Corequisite: EDU 4845. Attribute: Upper-Division. Class not open to freshmen, sophomores and juniors.

EDSP 4949 SECONDARY SPECIAL EDUCATION INTERNSHIP B (1-17) Registration approval: School of Education. Prerequisites: See Professional Quarters Four and Five secondary Program prerequisites. Extra fee. May be repeated for credit up to 17 credits. Attribute: Upper-Division. Class not open to freshmen, sophomores and juniors.

Technology Education

EDTC 2235 INTRODUCTION TO EDUCATIONAL TECHNOLOGY (2) Prerequisite: Admission to Professional Quarter One. Instruction on processes and procedures for using media and computers in school settings. Includes instructional design, basic production skills for computer, media and multimedia applications; and courseware evaluation. Corequisite: EDU 2103. Class not open to freshmen.
EDU 2103 FOUNDATIONS OF AMERICAN EDUCATION (3)
Registration approval: School of Education. Prerequisite: Admission to Professional Quarter One. Explores social, historical and philosophical foundations of American education. Focuses on teaching and curricula from ancient times to the present. Provides opportunities to apply course content through service learning and field-related experiences. Corequisite: EDTC 2235. Class not open to freshmen.

EDU 3102 APPLICATIONS OF EDUCATIONAL PSYCHOLOGY (2)
Registration approval: School of Education. Prerequisite: Professional Quarter One. This course will explore social, moral and cognitive aspects of human growth and development along with learning theories related to children and youth. These principles will form a broad base for the study and consideration of curricular, instructional assessment and behavior management. Corequisites: EDSP 3107, EDU 3104 and EDU 3105. Attribute: Upper-Division. Class not open to freshmen and sophomores.

EDU 3104 FOUNDATIONS OF MULTICULTURAL EDUCATION (2)
Registration approval: School of Education. Prerequisite: Professional Quarter One. An introduction to the historical background and theoretical constructs of multicultural education. Examines the nature of our diverse society and the implications for education. The nature of bias is discussed, and techniques are presented that foster positive expectations for all students. Corequisites: EDSP 3107, EDU 3102 and EDU 3105. Attribute: Upper-Division. Class not open to freshmen and sophomores.

EDU 3105 LABORATORY EXPERIENCE (3)
Registration approval: School of Education. Prerequisite: Professional Quarter One. Provides opportunity for the student to be placed in a school with diverse populations. Integration of learning and experience will be gained through observing and working with students in various classroom settings. Corequisites: EDSP 3107, EDU 3102 and EDU 3104. Attribute: Upper-Division. Class not open to freshmen and sophomores.

EDU 3106 LABORATORY EXPERIENCE (3)
Registration approval: School of Education. Gives students an opportunity for an additional, individualized laboratory experience. See EDU 3105. Attribute: Upper-Division. Class not open to freshmen and sophomores.

EDU 3361 SECONDARY ENGLISH METHODS (3)
Prerequisite: Professional Quarters One and Two. Explores teaching and planning methods and materials appropriate for middle school and senior high school students. Based on essential learnings, the course considers various learning styles, moral implications, literary works and writing activities in creating and sharing ideas and projects. Corequisite: EDU 3561. Attribute: Upper-Division.

EDU 3452 FIELD EXPERIENCE: ELEMENTARY MATHEMATICS AND SCIENCE (1-2)
Registration approval: School of Education. Prerequisite: Admission to the School of Education. This field experience will provide experiences teaching elementary math and science to bring back to the methods classroom for discussion and evaluation. It will also provide an environment for applying lessons and activities from the methods course. Corequisites: EDMA 4232 and EDSC 4234. Attribute: Upper-Division. Class not open to freshmen and sophomores.

EDU 3557 FIELD EXPERIENCE: SECONDARY MATHEMATICS (1)
Registration approval: School of Education. Prerequisite: Admission to the School of Education. This field experience will provide experiences teaching secondary mathematics to bring back to the methods classroom for discussion and evaluation. It will also provide an environment for applying lessons and activities from the methods course. The hours of observation and instruction will be flexible and scheduled to meet assignments in each of the subject area classes, the schedules of each cooperating classroom and the schedule of each student. Corequisite: EDSC 3559. Attribute: Upper-Division. Class not open to freshmen and sophomores.

EDU 3561 FIELD EXPERIENCE: SECONDARY ENGLISH (1)
Registration approval: School of Education. Prerequisite: Admission to the School of Education. This field experience will provide experiences teaching secondary English to bring back to the methods classroom for discussion and evaluation. It will also provide an environment for applying lessons and activities from the methods course. The hours of observation and instruction will be flexible and scheduled to meet assignments in each of the subject area classes, the schedules of each cooperating classroom and the schedule of each student. Corequisite: EDU 3361. Attribute: Upper-Division. Class not open to freshmen and sophomores.

EDU 3564 FIELD EXPERIENCE: SECONDARY SOCIAL STUDIES (1)
Registration approval: School of Education. Prerequisite: Admission to the School of Education. This field experience will provide experiences teaching secondary social studies to bring back to the methods classroom for discussion and evaluation. It will also provide an environment for applying lessons and activities from the methods course. The hours of observation and instruction will be flexible and scheduled to meet assignments in each of the subject area classes, the schedules of each cooperating classroom and the schedule of each student. Corequisite: EDU 4364. Attribute: Upper-Division. Class not open to freshmen and sophomores.

EDU 4323 SOCIAL STUDIES METHODS: ELEMENTARY EMPHASIS (3)
Registration approval: School of Education. Prerequisite: Admission to the School of Education. Explores interdisciplinary approach for teaching elementary school social studies and develops strategies for implementation in the classroom. Corequisites: EDRD 4231, EDU 4233 and EDU 4941. Attribute: Upper-Division. Class not open to freshmen, sophomores and juniors.

EDU 4364 TEACHING SECONDARY SOCIAL STUDIES (3)
Registration approval: School of Education. Prerequisite: Completion of Professional Quarter Two. This course requires two weeks of observation and assistance at the opening of a school year or in a program that reflects the level and subject matter preferred by the preservice teacher. It will include any faculty meetings, preparation days and in-service workshops that take place prior to the students’ arrival at school. The intern will then remain for the first two weeks of the school year. Course equivalent: EDU 6942. Attribute: Upper-Division. Class not open to freshmen and sophomores.

EDU 4315 MIDDLE SCHOOL METHODS (3)
Registration approval: School of Education. Prerequisite: Admission to the School of Education. This course is designed to prepare students for internships in middle school or junior high school with special emphasis in collaboration and subject matter integration at the middle level and the social, moral and cognitive parts of early adolescent development. Attribute: Upper-Division. Class not open to freshmen and sophomores.

EDU 4364 TEACHING SECONDARY SOCIAL STUDIES (3)
Registration approval: School of Education. Prerequisite: Professional Quarters One and Two. Presents specific elements of secondary social studies instruction, including content selection and planning based on essential learnings, moral implications of content, use of instructional strategies, assessment of student learning and management of the classroom. Corequisite: EDU 3564. Attribute: Upper-Division. Class not open to freshmen and sophomores.

EDU 4511 STRATEGIES IN EARLY CHILDHOOD (3)
Prerequisite: FCS 3220. Provides opportunities to observe and participate with children in a preschool or kindergarten and to observe the role of the teacher as a participant. Implementation and evaluation of models, methods and materials relevant to programs for children in preschool, day-care centers and kindergarten. Offered summers only. Attribute: Upper-Division. Class not open to freshmen.
EDU 4530 TOPICS IN SECONDARY EDUCATION (2) Registration approval: School of Education. Prerequisite: Admission to School of Education. Explores major topics related to instruction in the secondary classroom, including student assessment, reading and study skills, and child abuse. Attribute: Upper-Division. Class not open to freshmen and sophomores.

EDU 4845 SECONDARY STUDENT TEACHING SEMINAR (1) Registration approval: School of Education. Prerequisite: Completion of professional quarters one, two and three. These seminars will provide an opportunity for student teachers to share experiences from their internship, as well as a forum for developing additional ideas and skills in key areas of instruction and management. Special attention will be paid to developing explicit links between theory previously learned and the particular internship placement of each student. Concurrent enrollment in the first quarter of internship is required. Attribute: Upper-Division. Class not open to freshmen, sophomores and juniors.

EDU 4941 ELEMENTARY SCHOOL INTERNSHIP A (1-17) Registration approval: School of Education. Prerequisites: Same as for EDU 4941. (Second or third quarter.) Provides opportunity for observation and daily teaching in the elementary school under the direction of a cooperating teacher. Extra fee. May be repeated for credit up to 17 credits. Corequisites: EDRD 4231, EDU 4230 and EDU 4233. Attribute: Upper-Division. Class not open to freshmen, sophomores and juniors.

EDU 4942 ELEMENTARY SCHOOL INTERNSHIP B (1-17) Registration approval: School of Education. Prerequisites: Same as for EDU 4941. (Second or third quarter.) Provides opportunity for observation and daily teaching in the elementary school under the direction of a cooperating teacher. Extra fee. May be repeated for credit up to 17 credits. Attribute: Upper-Division. Class not open to freshmen, sophomores and juniors.

EDU 4943 ELEMENTARY INTERNSHIP: MUSIC (1-17) Registration approval: School of Education. Prerequisites: Same as for EDU 4941. Provides opportunity for observation and daily teaching in the elementary school under the direction of a cooperating teacher. Extra fee. May be repeated for credit up to 17 credits. Corequisite: EDU 4230. Attribute: Upper-Division. Class not open to freshmen, sophomores and juniors.

EDU 4944 ELEMENTARY INTERNSHIP: ART (1-17) Registration approval: School of Education. Prerequisites: Same as for EDU 4941. Provides opportunity for observation and daily teaching of art in the elementary school under the direction of a cooperating teacher. Extra fee. May be repeated for credit up to 17 credits. Corequisite: EDU 4230. Attribute: Upper-Division. Class not open to freshmen, sophomores and juniors.

EDU 4945 SECONDARY INTERNSHIP A (1-17) Registration approval: School of Education. Prerequisites: See Professional Quarters Four and Five elementary program prerequisites (first quarter). Provides opportunity for observation and daily teaching in an international elementary school setting under the direction of a cooperating teacher. Extra fee. May be repeated for credit up to 17 credits. Corequisite: EDU 4230. Attribute: Upper-Division. Class not open to freshmen, sophomores and juniors.

EDU 4946 SECONDARY INTERNSHIP B (1-17) Registration approval: School of Education. Prerequisites: EDU 4945. Second quarter of two-quarter internship. Provides opportunity for observation and daily teaching in public or approved private schools under the direction of a master teacher. Extra fee. May be repeated for credit up to 17 credits. Attribute: Upper-Division. Class not open to freshmen, sophomores and juniors.

EDU 4951 INTERNATIONAL ELEMENTARY SCHOOL INTERNSHIP (8-17) Registration approval: School of Education. Prerequisite: Completion of certification program. Observation and daily teaching in an international elementary school setting under the direction of a cooperating teacher. Attribute: Upper-Division. Extra fee. May be repeated for credit up to 17 credits. Corequisite: EDU 4230. Attribute: Upper-Division. Class not open to freshmen, sophomores and juniors.

EDU 4948 ELEMENTARY INTERNSHIP: PHYSICAL EDUCATION (1-17) Registration approval: School of Education. Prerequisites: Same as for EDU 4941. Provides opportunity for observation and daily teaching in public or approved private schools under the direction of a master teacher. Extra fee. May be repeated for credit up to 17 credits. Corequisite: EDU 4230. Attribute: Upper-Division. Class not open to freshmen, sophomores and juniors.

Faculty
Lisa A. Bjork, Associate Professor of Education; Director of Continuing Education; B.A., Immaculate Heart College, 1967; Teaching Certificate, California State University-Los Angeles, 1969; M.Ed., Western Washington University, 1978; M.Ed., Harvard Graduate School of Education, 1985; Ed.D., Harvard Graduate School of Education. At SPU since 2000.


Russ Killingsworth, Assistant Professor of Mathematics and Math Lab Coordinator; B.A., California State University-Sacramento, 1986; M.A., California State University, Stanislaus, 1992. At SPU since 1996.

Frank M. Kline, Associate Professor of Education; Assistant Dean for Teacher Education; B.S., Greenville College, 1978; M.Ed., Wichita State University, 1981; Ph.D., University of Kansas, 1989. At SPU since 1996.

Michelle LaRocque, Assistant Professor, Alternative Certification Program; B.S., Michigan State University, 1987; M.Ed., Tufts University, 1995; Ph.D., University of Washington, 2001. At SPU since 2000.

Nyaradzo Mvududu, Assistant Professor of Education; B.B.S., University of Zimbabwe, 1986; M.B.A., University of Washington, 1994; Ed.D., Seattle Pacific University, 2002. At SPU since 2000.

Raymond E. Myers, Professor of Science Education; B.S., Wayne State University, 1963; M.S., Oregon State University, 1968; Ed.D., 1978. At SPU since 1987.

Annette B. Robinson, Associate Professor of Special Education; B.A., University of Washington, 1966; M.Ed., 1969; Ph.D., 1976. At SPU since 1977.

William J. Rowley, Associate Professor of School Counseling; Dean of the School of Education; B.A., Pasadena College, 1962; M.A., San Jose State College, 1967; Ed.D., University of Northern Colorado, 1973. At SPU since 1996.
Engineering
Miller Science Learning Center
(206) 281-2140
www.spu.edu/depts/egr

Anthony Donaldson, Director and EE Chair; Kevin Bolding, Don Bowie, Brad Gjerding, John Lindberg, Donald Peter, Melani Plett, Phil Prins, Mike Tindall

In a Christian context, engineering is a ministry of designing, manufacturing and marketing products that serve and preserve God's creation. An engineer applies the principles of science and mathematics to create economically the tools, products and processes that people want or need. Today, as civilization becomes more complex the engineer must have a deeper understanding of the physical world, a wider versatility with mathematical and experimental techniques and an increased sensitivity to the long-term effects of technology on people. The engineering program not only develops these skills in the applied sciences, but it also provides the liberal arts enrichment that makes the engineer better able to communicate ideas to other segments of our society. A more complete description of our vision and goals is found at the Web site, www.spu.edu/depts/egr/vision.

Majors
SPU offers B.S. degrees in electrical engineering (BSEE), computer engineering (BSCPE) and engineering and applied science (BSEAS). The BSEE degree is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET). The BSEAS degree offers options in bio-engineering, engineering physics, environmental engineering and missions applications. The missions application option is a unique blend of practical engineering training for the missions setting and an opportunity to minor in global and urban ministries.

To offer the advantages of combined Christian liberal arts and other engineering majors, SPU has formal arrangements for dual degree programs with the University of Washington, Columbia University in New York and the University of Southern California. For example, if a student is interested in aeronautical, civil or mechanical engineering, he or she can obtain a baccalaureate from SPU and a B.S. from the participating engineering school. Three years are spent in residence at SPU, during which time the student satisfies many requirements for the B.S. degree by taking the core Christian foundations, liberal arts and prescribed courses in chemistry, physics, mathematics and engineering. If the student then fulfills the entrance requirements, he or she may transfer to the participating university. At that university, the student would spend two years in civil or mechanical engineering to complete the second degree. Details of this 3/2 transfer program are available from the director of engineering. Seattle Pacific University engineering seniors are urged to take Washington state's Department of Licensing examination for engineer-in-training. Those passing the test are certified by Washington state as licensed engineers-in-training.

Evening Electrical and Computer Engineering Program
In addition to the day courses, evening courses in electrical and computer engineering make a BSEE or BSCPE degree available for students who work full-time during the day. Contact the director of engineering at (206) 281-2296 for more information.

Intern Program
All engineering majors are required to do an internship with industry or another career entity. Normally this internship is accomplished during the summer between their junior and senior years. In almost all cases the internships are paid. These internships are facilitated by the director of engineering.

Expectations of Entering Students
In addition to meeting all the general SPU admission requirements, the high school graduate entering the engineering program should present a high school record showing four years of mathematics and one year of physics or chemistry (preferably both). SAT scores of at least 1100 are recommended. Those students entering with deficiencies should consult an engineering advisor for a program of preparation for the engineering curriculum. Scores higher than 1200 are given consideration for freshman engineering scholarships. Transfer students should have at least a 2.75 transfer GPA; and a 3.0 is preferred.

Admission to the Major
Student performance during the first two years will be used as an indicator of the student’s promise of success in engineering. Application for admission to the major should be made in the spring of the sophomore year. The engineering faculty will review these applications.

Students with SPU grade-point averages below 2.5 are normally not granted admission to the major. Transfer students (sophomores and beyond) may apply after one full quarter of classwork (12 or more hours) in the SPU engineering program. Students must be admitted to the major prior to taking senior (4000-level) courses. A “C-” or better is required in all courses in the major.

Humanities and Social Science Requirement
To satisfy ABET accreditation guidelines, all engineering students must take at least 24 credits of philosophy, religion, history, literature, fine arts, sociology, psychology, political science or foreign languages other than a student's native language(s). These courses satisfy a general humanities and social-science accreditation requirement. Students who take the full SPU Core and
Exploratory general education program more than meet this requirement. However, transfer students should carefully select their courses to insure they fulfill the 24-credit humanities and social-science requirement both in breadth and depth. They must see their assigned general education advisor to insure this requirement is met.

EE majors are exempt from the foreign language requirement.

Requirements for the Computer Engineering (CPE) Major
(130–134 credits; 62–66 upper-division)

Mathematics
MAT 1225, 1226 Calculus ................................................. 10
MAT 1228 Series and Differential Equations .................. 5
MAT 2375 Probability ............................................................ 2
MAT 2376 Statistics ............................................................. 3
MAT 2401 Linear Algebra ....................................................... 3

Science
PHY 1121, 1122, 1123 Physics for Science and Engineering ........................................ 15

Computer Science
CSC 1230 Programming ....................................................... 5
CSC 2430 Data Structures ..................................................... 5
CSC 2431 Data Structures II .................................................. 5
CSC 3150 Systems Design ..................................................... 5

Electrical Engineering
EGR 1401 Intro to Engineering .............................................. 2
EGR 3000 Engineering Seminar .......................................... 1
EGR 3730 Engineering Design or EE 3028 ...................... 5,4
EGR 4740 Internship Prep .................................................... 1
EGR 4940 Internship Report ................................................. 1

Computer Engineering
CPE 3280 Microcontroller System Design ...................... 5
CPE 3350 System Programming ........................................... 4
CPE 3760 Computer Organization and Assembly Language ........................................ 5
CPE 4211, 4212, 4213 Microprocessor System Design I, II, III ........................................ 9
CPE 4760 Advanced Computer Architecture ...................... 4

Electives
Three courses from below or other approved upper-division:
CPE 4150 Software Engineering ........................................... 4
CPE 4350 Operating Systems ................................................ 4
CSC 4750 Computer Networks ............................................. 4
EE 3410 Signal Analysis ..................................................... 5
EE 3550 Communication System Analysis ....................... 5

Requirements for the Computer Engineering
(CPE) Minor
(34 credits; 15 upper-division)
CSC1230 Programming ...................................................... 5
CSC 2430 Data Structures ..................................................... 5
CSC 3150 Systems Design ..................................................... 5
CPE 3760 Computer Organization ........................................ 5

CPE 3280 Microcontroller System Design ...................... 5
EE 1210 Introduction to Logic System Design ............... 5
EE 2726 Electric Circuits ..................................................... 4

Requirements for the Electrical Engineering (EE) Major
(139–146 credits; 63–75 upper-division)
(Refer to pages 68–70 for a summary of degree requirements.)

Because engineering courses require many mathematics and science prerequisites, the electrical engineering major must specify those prerequisites, leaving few electives. However, the 15-credit natural-science general education requirement is met by the courses in this major. Note that electrical engineering students are not required to fulfill the foreign language competency. The BSEE degree can be completed in four years by taking approximately 17 credits per quarter. A four-year plan is available from the department. Taking and reporting the EIT score is required. The following coursework is required of all students majoring in electrical engineering:

Mathematics
MAT 1225, 1226 Calculus ..................................................... 10
MAT 1228 Series and Differential Equations .................. 5
MAT 2228 Multivariable Calculus ...................................... 3
MAT 2375 Probability (or upper-division math-related course) ........................................ 2
MAT 2401 Linear Algebra ..................................................... 3

Science
CHM 1211 General Chemistry (requirement replaced with EGR 3841 if high school chemistry) ........................................ 5
BIO General Education Biology course ........................................ 5
PHY 1121, 1122, 1123 Physics for Science and Engineering ........................................ 15

Engineering Science
CSC 1230 Problem Solving and Programming .................. 5
CSC 2430 Data Structures and Programming .................. 5
Technical Electives (choices include MAT 2376, 3724, CSC 2431, EE 3500, EGR 2391, 2891, 3401, 3650, 3600, 3800, EE 4560) ..................................................... 9–11

Certain combinations result in an emphasis within EE.

Emphases are biomedical, business, computer science, energy and power, environmental, math and physics.

EGR 1402 Intro to Engineering ............................................. 2
EGR 3000 Engineering Seminar .......................................... 1
EGR 3401 Intro to Engineering II (required for transfer students only) ........................................ 2
EGR 3841 Dynamics ......................................................... 5
EGR 4740 Intern Prep .......................................................... 1
EGR 4940 Internship .......................................................... 1

Electrical Engineering
EE 1210 Introduction to Logic System Design ............... 5
EE 2726, 2727, 3028 Electric Circuits I, II, III .................. 12
EE 3280 Microcontroller System Design ....................... 5
EE 3410 Signal and System Analysis ................................. 5
EE 3550 Communication System Analysis ....................... 5
EE 3721, 3722 Electronics I, II .......................................... 10
EE 3730 Electronic Design .................................................... 5
### Requirements for the Electrical Engineering Minor

(37 credits; 24 upper-division)

The minor in electrical engineering consists of basic digital and analog circuits courses, plus 15 credits of elective EE courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 3760 Computer Organization and Assembly Language</td>
<td>5</td>
</tr>
<tr>
<td>EE 1210 Introduction to Logic System Design</td>
<td>5</td>
</tr>
<tr>
<td>EE 2726 Circuits I</td>
<td>4</td>
</tr>
<tr>
<td>EE 2727 Circuits II</td>
<td>4</td>
</tr>
<tr>
<td>EE 3028 Circuits III</td>
<td>4</td>
</tr>
<tr>
<td>EE courses (upper-division)</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>37</strong></td>
</tr>
</tbody>
</table>

### Requirements for the Engineering and Applied Science (EAS) Major

(103–140 credits; 27–50 upper-division)

(Refer to pages 68–70 for a summary of degree requirements.)

The engineering and applied science major offers a unique program that combines a basic engineering foundation with an applied science. Because engineering courses require many mathematics and science prerequisites, the engineering and applied science major must specify those prerequisites, leaving few electives. However, the 15-credit natural-science general education requirement is met by the courses in this major. Normally, the BSEAS degree can be completed in four years by taking approximately 16 credits per quarter. The following coursework is required of all students majoring in engineering and applied science:

#### EAS Core Requirements

**Mathematics**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 1225, 1226 Calculus</td>
<td>10</td>
</tr>
<tr>
<td>MAT 1228 Series and Differential Equations</td>
<td>5</td>
</tr>
</tbody>
</table>

**Science**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 2101 General Biology</td>
<td>5</td>
</tr>
<tr>
<td>CHM 1211 General Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>PHY 1121, 1122, 1123 Physics for Science</td>
<td>15</td>
</tr>
</tbody>
</table>

**Engineering Science**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 1230 Problem Solving and Programming</td>
<td>5</td>
</tr>
<tr>
<td>EGR 1402 Intro to Engineering</td>
<td>2</td>
</tr>
<tr>
<td>EGR 1125 Engineering Study Prep (x3)</td>
<td>3</td>
</tr>
<tr>
<td>EGR 3402 Intro to Engineering II (required for transfer students only)</td>
<td>2</td>
</tr>
<tr>
<td>EGR 2891 Statics</td>
<td>4</td>
</tr>
<tr>
<td>EGR 3000 Engineering Seminar</td>
<td>1</td>
</tr>
<tr>
<td>EGR 3401 Thermodynamics</td>
<td>4</td>
</tr>
<tr>
<td>EGR 3841 Dynamics</td>
<td>5</td>
</tr>
<tr>
<td>EGR 4740 Internship Prep</td>
<td>1</td>
</tr>
<tr>
<td>EGR 4940 Engineering Internship</td>
<td>1</td>
</tr>
</tbody>
</table>

**Electrical Engineering**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 2726, 2727, 3028 Electric Circuits I, II, III</td>
<td>12</td>
</tr>
<tr>
<td>EGR 4961 Senior Portfolio</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>69–74</strong></td>
</tr>
</tbody>
</table>

ECN 1100 (5) Fundamentals of Economics is a recommended general education course.

In addition to the courses above, one of the following options must be satisfied by completing the minimum coursework listed:

**Bio-Engineering**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 3325 Genetics</td>
<td>5</td>
</tr>
<tr>
<td>CHM 2371, 2372 Organic Chemistry</td>
<td>10</td>
</tr>
<tr>
<td>CHM 3225 Chemical Equilibrium and Analysis</td>
<td>5</td>
</tr>
<tr>
<td>EGR 3800 Biomedical Engineering I</td>
<td>5</td>
</tr>
<tr>
<td>EGR 4311 Engineering Senior Design Lab</td>
<td>5</td>
</tr>
<tr>
<td>EGR 4352 Cell Biology</td>
<td>5</td>
</tr>
<tr>
<td>Tech Electives (Choices: CSC 2430, 2431, EGR 3226, MAT 2401, EE 3410, PHY 4311, BIO 4418 or other approved upper-division electives)</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total (including EAS core courses)</strong></td>
<td><strong>119–124</strong></td>
</tr>
</tbody>
</table>

**Environmental Engineering**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 2103 General Biology III</td>
<td>5</td>
</tr>
<tr>
<td>BIO 3310 Ecology</td>
<td>5</td>
</tr>
<tr>
<td>CHM 2371 Organic Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>CHM 3225 Chemical Equilibrium and Analysis</td>
<td>5</td>
</tr>
<tr>
<td>EGR 3226 Quantitative and Instrumental Analysis</td>
<td>5</td>
</tr>
<tr>
<td>EGR 3600 Environmental Engineering I</td>
<td>5</td>
</tr>
<tr>
<td>EGR 4311 Engineering Senior Design Lab</td>
<td>5</td>
</tr>
<tr>
<td>Tech Electives (Choices: CSC 2430, 2431, EE 3410, EGR 3841, MAT 2401, PHY 4311)</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total (including EAS core courses)</strong></td>
<td><strong>119–124</strong></td>
</tr>
</tbody>
</table>

**Mission Applications** (approved minor required)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 2700 Statistics</td>
<td>5</td>
</tr>
<tr>
<td>EE 3500 Power Systems</td>
<td>5</td>
</tr>
<tr>
<td>EE 4950 Topics in EE (preferably telecommunications)</td>
<td>5</td>
</tr>
<tr>
<td>EGR 3650 Alternative Energies</td>
<td>5</td>
</tr>
<tr>
<td>EGR 3600 Environmental Engineering I</td>
<td>5</td>
</tr>
<tr>
<td>EGR 4311 Engineering Senior Design Lab</td>
<td>5</td>
</tr>
<tr>
<td>EGR 4940 Engineering Internship</td>
<td>5</td>
</tr>
<tr>
<td>Tech Electives (taken for 5 credits not 1)</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total (including EAS core courses)</strong></td>
<td><strong>104–109</strong></td>
</tr>
</tbody>
</table>

**Engineering Physics**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHY 2321 Intermediate Physics</td>
<td>5</td>
</tr>
<tr>
<td>PHY 3312, 3313 Advanced Physics Lab</td>
<td>4</td>
</tr>
<tr>
<td>EE 1210 Intro to Logic System Design</td>
<td>5</td>
</tr>
<tr>
<td>EE 3721 Electronics I, II</td>
<td>10</td>
</tr>
<tr>
<td>EE 3280 or 3410 Microcontrollers or Signals and Systems</td>
<td>5</td>
</tr>
<tr>
<td>EE 3760 Computer Organization</td>
<td>5</td>
</tr>
<tr>
<td>EE 4310 Electromagnetics</td>
<td>5</td>
</tr>
<tr>
<td>MAT 2228 Multivariable Calculus</td>
<td>3</td>
</tr>
<tr>
<td>MAT 3724 Applied Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Tech Elective</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total (including EAS core courses)</strong></td>
<td><strong>119–124</strong></td>
</tr>
</tbody>
</table>
Engineering Transfer Program Curriculum

Students may wish to obtain their Christian liberal arts and basic engineering education at SPU. Later they may want to transfer to another university and obtain an engineering degree not offered at SPU. Students may select mathematics, science and engineering courses, which they may transfer, from the following list:

**Mathematics**
- MAT 1225, 1226 Calculus (10)
- MAT 1228 Series and Differential Equations (5)
- MAT 2228 Multivariable Calculus (3)
- MAT 2401 Linear Algebra (3)

**Science**
- CHM 1211 General Chemistry (5)
- CHM 2371, 2372 Organic Chemistry (10)
- PHY 1121, 1122, 1123 Physics for Science and Engineering (15)

**Computer Engineering Courses**
- CPE 1210 Intro to Engineering (5)
- EGR 1125 Engineering Study Preparation (1)
- EGR 1210 or CSC 1230 (5)
- EGR 1402 Intro to Engineering (2)
- EGR 2726, 2727 Circuits I, II (8)
- EGR 2891 Statics (4)
- EGR 3401 Thermodynamics (4)
- EGR 3841 Dynamics (5)

**Suggested Course Sequence for All Engineering Students During Their Freshman Year**

**Autumn**
- EE 1210 or CSC 1230 (5)
- MAT 1225 Calculus (5)
- USEM 1000 (Check for specific ones) (5)
- EGR 1402 Intro to Engineering (2)
- EGR 1125 Engineering Study Preparation (1)

**Winter**
- MAT 1226 Calculus (5)
- CSC 1230 or EE 1210 or for EAS majors, Explanatory Curriculum (5)
- EGR 1230 or EE 1210 or for EAS majors, Explanatory Curriculum (5)
- UCOR/UFDN 1000 (5)

**Spring**
- MAT 1228 Differential Equations (5)
- CSC 2430 Problem Solving and Programming or for EAS majors, Explanatory Curriculum (5)
- UCOR/UFDN 1000 (5)

**Note:** For EAS majors, one hour of EGR 1125 is required each quarter of the freshman year; for EE and CPE it may be required depending on the math exam outcome the first quarter. Details of the sophomore through senior course scheduling are available online and in the Engineering Student Handbooks.

**Computer Engineering Courses**

**CPE 3280 MICROCONTROLLER SYSTEM DESIGN (5)** Prerequisites: EE 1210 and EE/CSC/CPE 3760. Design of hardware and software for embedded systems using a modern microcontroller. Covers hardware interfacing, including memory system design, interrupt interfacing, and use of internal and external peripheral devices. Emphasis is placed on assembly language programming of the microcontroller, including device drivers, exception and interrupt handling, and interfacing with higher-level languages. Laboratory exercises require assembly language programming and hardware design. Course equivalent: EE 3280. Attribute: Upper-Division.

**CPE 3350 COMMUNICATION SYSTEM ANALYSIS (5)** Prerequisite: EE 2727. An introduction to principles of modern communication systems with an emphasis on current technological applications. Covers basics such as transmission media (electrical, optical and wireless), analog and digital signaling techniques, data encoding methods and multiplexing mechanisms. Modern communication protocols for networks (Ethernet, IP) and radio links (CDMA, GSM) are analyzed. High-level issues such as security, encryption, cellular management and network modeling are studied. Course equivalent: EE 3550. Attribute: Upper-Division.

**CPE 3760 COMPUTER ORGANIZATION (5)** Prerequisite: CSC 2430 and EE 1210. Study of organization and structuring of the major hardware and software components of computers. Includes mechanics of information transfer and control within a digital computer system. Introduces computer architecture, machine instruction sets and assembly language programming. Course equivalents: CSE 3760 and EE 3760. Attribute: Upper-Division.

**CPE 4150 SOFTWARE ENGINEERING (4)** Prerequisites: CSC 2431 and CSC 3150. Covers topics in software engineering, including team programming, project planning and management, SDLC (software development life cycle) and software quality assurance. Surveys automated tools for use in software engineer- ing. Course requirements include the design and implementation of a major software project. Course equivalent: CSC 4150. Attribute: Upper-Division.

**CPE 4211 MICROPROCESSOR-BASED MIXED SIGNAL SYS- TEM DESIGN I (3)** Prerequisites: EE/CPE 3280 and EE/EGR 3730. Study of mixed digital and analog system design including embedded software design. Student teams begin a system level design of a company-sponsored project (a non-disclosure agreement may be required). Projects typically include use of a microcontroller and may include analog-to-digital converters, digital signal-processing chips, external memories, power supplies, user interfaces and more. Students provide detailed schedules for building prototype systems and present periodic progress reports. During the course, students produce a technical specification, undergo a preliminary design review (PDR) and build a working prototype system. Course equivalent: EE 4211. Attribute: Upper-Division.

**CPE 4212 MICROPROCESSOR-BASED MIXED SIGNAL SYS- TEM DESIGN II (3)** Prerequisite: EE/CPE 4211. Continued study of mixed digital and analog system design including embedded software design. Student teams design printed circuit boards for their products using CAD PCB layout tools and continue to refine the prototype hardware and software designs from EE 4211. Teams write detailed technical reports and submit their designs to design reviews (CDR). Periodic progress reports and team presentations are required. Course equivalent: EE 4212. Attribute: Upper-Division.

**CPE 4350 OPERATING SYSTEMS (4)** Prerequisite: CPE/CSC 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: CSC 4350. Attribute: Upper-Division.

CPE 4899 MICROPROCESSOR-BASED MIXED SIGNAL SYSTEM DESIGN III (3) Prerequisite: EE/CPE 4212. In this capstone course designs from EE 4212 are developed into a manufacturing prototype and tested. Covers testing methodology (hardware and software), board debugging and documentation methodology. Teams author operations manuals and detailed technical manuals. Periodic progress reports and final presentations are required. Includes study of vocation in engineering and writing reflective responses. Completion of the University Christian Faith Exploration (CFE) Senior Project is required. Course equivalent: EE 4899. Attributes: Upper-Division, and Writing Course.

CPE 4800 INDEPENDENT STUDY (1-5) Registration approval: Independent Study Agreement.

Electrical Engineering Courses

EE 1210 INTRODUCTION TO LOGIC SYSTEM DESIGN (5) Introduction to digital logic design including combinational and sequential logic design with implementation using programmable logic devices and CMOS transistors. Combinational logic covers truth tables, Boolean algebra, logic gates, Karnaugh maps, multiplexers, decoders, ROMs, PLAs and PALS. Sequential logic covers latches, flip-flops, clocks, registers, counters, finite state machines and modern PLDs. Special emphasis is placed on design techniques. Laboratory exercises include designs using both discrete TTL gates and PLDs.

EE 2726 ELECTRIC CIRCUITS I (4) Prerequisite: MAT 1228. Study of Basic Ohm’s and Kirchhoff’s laws, voltage/current sources, nodal and mesh analysis, power transfer, Thévenin’s and Norton’s theorems and superposition. Introduction to operational amplifiers, inductance, capacitance and first-order state variable analysis. Includes lab problems and introduction to PSpice and MATLAB computer software. The first of a three-course sequence in which the engineer as servant is discussed.

EE 2727 ELECTRIC CIRCUITS II (4) Prerequisite: EE 2726. Introduction to second-order state variable analysis. Alternating current theory and analysis, power, frequency response, resonance and pole-zero concepts. Introduction to three-phase systems, transformers and analog filter design. Includes lab problems, PSpice and MATLAB.

EE 3000 ELECTRICAL ENGINEERING SEMINAR (1) Seminar and Colloquia on topics related to the electrical engineering mission statement. Attribute: Upper-Division.

EE 3028 ELECTRIC CIRCUITS III (4) Introduction to Laplace transforms applied to network analysis, transmission line theory, signal processing, two-port theory and the use of Fourier series and Fourier transforms. The lab portion includes a design project, the use of PSpice, MATLAB and Labview. Attribute: Upper-Division.

EE 3260 MICROCONTROLLER SYSTEM DESIGN (5) Prerequisites: EE 2726, and CPE 3760. Design of hardware and software for embedded systems using a microcontroller. Covers hardware interfacing including memory system design, interrupt interfacing, and use of internal and external peripheral devices. Emphasis is placed on assembly language programming of the microcontroller including device drivers, exception and interrupt handling, and interfacing with higher-level languages. Laboratory exercises require assembly language programming and hardware design. Course equivalent: CPE 3280. Attribute: Upper-Division.


EE 3500 INTRODUCTION TO POWER SYSTEMS (5) Prerequisite: EE 2727. Three-phase power generation, transmission and distribution systems. Safety and electric code standards. Practical training in material and component selection for commercial and industrial applications. Attribute: Upper-Division.

EE 3510 INTRODUCTION TO POWER ELECTRONICS (4) Prerequisite: EE 3722. Studies semiconductor switching devices, rectification; switch-mode ac-dc, dc-dc, converters; switching dc power supplies, conditioners and uninterruptible supplies, residential and industrial applications. Includes laboratory exercises. Attribute: Upper-Division.

EE 3550 COMMUNICATION SYSTEM ANALYSIS (5) Prerequisite: EE 2727. An introduction to principles of modern communication systems with an emphasis on current technological applications. Covers basics such as transmission media (electrical, optical and wireless), analog and digital signaling techniques, data encoding methods and multiplexing mechanisms. Modern communication protocols for networks (Ethernet, IP) and radio links (CDMA, GSM) are analyzed. High-level issues such as security, encryption, cellular management and network modeling are studied. Course equivalent: CPE 3550. Attribute: Upper-Division. Class open to electrical engineering majors.

EE 3721 ELECTRONICS I–ANALOG DEVICES AND CIRCUITS (5) Prerequisite: EE 2727. Study of electronic devices and basic circuit configurations. Topics covered include operational amplifiers, diodes, ac to dc conversion, amplifier principles, bipolar junction transistors, field-effect transistors and differential amplifiers. Begins sequence of nontechnical aspects of engineering with readings and discussions on the engineering profession and management, self-management, communication and relationships with others. Includes interactive experiences with students from a business course on operations management. Includes lab problems. Attribute: Upper-Division.

EE 3722 ELECTRONICS II ANALOG ELECTRONICS (5) Prerequisite: EE 3721. Study of frequency response, feedback, output stages and power amplifiers, analog integrated circuits, filters and an introduction to power electronics. Continues sequence of nontechnical aspects of engineering, covering project management, design and ethics. Includes interaction with business students in activities. Includes lab problems. Attribute: Upper-Division.

EE 3730 ENGINEERING DESIGN (5) Prerequisite: EE 3722. An interdisciplinary design course for both electrical engineering (EE) and engineering and applied science (EAS) students. Team design and construction of industrial or self-designed projects. Typical EE projects require analog and digital electronic circuit design, development, construction and testing. EAS design projects require some aspect of the student’s chosen science discipline. Interdisciplinary projects are encouraged. All projects require oral and written reports. Includes review and analysis of professional papers within a student’s discipline. Continues sequence of nontechnical aspects of engineering, covering decision economics and career planning. Includes interactive activities with business students. Course equivalent: EGR 3730. Attributes: Upper-Division.

EE 3760 COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE (5) Prerequisites: CSC 2430 and EE 1210. Study of organization and structuring of the major hardware and software components of computers. Includes 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 CSC 3760. Attribute: Upper-Division.

EE 4211 MICROPROCESSOR-BASED MIXED SIGNAL SYSTEM DESIGN I (3) Prerequisites: EE/CPE 3280 and EE/EGR 3730. Study of mixed digital and analog system design, including embedded software design. Student teams begin a system level design of a project (a nondisclosure agreement may be required). Projects typically include use of a microcontroller and may include analog-to-digital converters, digital signal-processing chips, external memories, power supplies, user interfaces and more. Students provide detailed schedules for building prototype systems and present periodic progress reports. During the course, students produce a technical specification, undergo several design reviews and build a working prototype system. Course equivalent: CPE 4211. Attribute: Upper-Division.

EE 4212 MICROPROCESSOR-BASED MIXED SIGNAL SYSTEM DESIGN II (3) Prerequisite: CPE/EE 4211. Continued study of mixed digital and analog system design, including embedded software design. Student teams design printed circuit boards for their products using CAD PCB layout tools and continue to refine the prototype hardware and software designs from EE 4211. Teams write detailed technical reports and submit their designs to design reviews. Periodic progress reports and team presentations are required. Course equivalent: CPE 4212. Attribute: Upper-Division.
EE 4310 ELECTROMAGNETICS (5) Prerequisites: MAT 1228, MAT 2228, and either PHY 1103 or PHY 1123. Study of electrostatics, magnetostatics, boundary conditions and boundary-value solutions, Maxwell’s equations, electromagnetic waves and their propagation, transmission lines, waveguides and antennas. Includes computer and laboratory experiments. Course equivalent: PHY 4310. Attribute: Upper-Division.

EE 4311 OPTICS AND LASERS (5) Prerequisite: PHY 4310. General theory of geometrical optics, physical optics, fiber optics, polarization and coherent states and optical devices. Four lectures and one laboratory each week. Offered on demand. Course equivalent: PHY 4311.

EE 4450 CONTROL SYSTEM DESIGN (5) Prerequisite: EE 3410. Analog and digital control system design using root locus, frequency and PID methods. Includes a comprehensive design and test of a real-time digital control system. MATLAB and SIMULINK are used extensively as design tools. Attribute: Upper-Division. Class open to electrical engineering and engineering science majors.

EE 4491 SOLID STATE PHYSICS (2-5) Prerequisite: PHY 2231; PHY 4441 recommended. Focuses on lattice statics and dynamics, electrons and Fermi surfaces, transport phenomena, semiconductors and superconductivity. Offered alternate years. Course equivalent: PHY 4491.

EE 4560 WIRELESS COMMUNICATION SYSTEMS (5) Prerequisite: EE 3550. Students study radio frequency (RF) and other wireless communications systems with an emphasis on current methods and standards. Transmission and reception concepts including high- and low-gain antennas, power budget analysis, attenuation, interference, fading and bandwidth are studied. Modern wireless communications protocols used for mobile telephones, computer networking and broadcast radio/television are explored in detail. Attribute: Upper-Division.

EE 4899 MICROPROCESSOR-BASED MIXED SIGNAL SYSTEM DESIGN III (3) Prerequisite: EE/CPE 4212. In this capstone course designs from EE 4212 are developed into a manufacturing prototype and tested. Covers testing methodology (hardware and software), board debugging and documentation methodology. Teams author operations manuals and detailed technical manuals. Periodic progress reports and final presentations are required. Includes study of vocation in engineering and writing reflective responses. Completion of the University Christian Faith Exploration (CFE) senior project is required. Course equivalent: CPE 4899. Attributes: Upper-Division; and Writing Course.

EE 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.

EE 4950 TOPICS IN ELECTRICAL ENGINEERING (1-5) Registration approval: Instructor. An advanced course studying a special interest topic in electrical engineering. Topics and credits may vary between offerings. Attribute: Upper-Division. Class open to electrical engineering and engineering science majors. Class not open to freshmen and sophomore, and other non-EE and engineering and applied science (EAS) students. Team design interdisciplinary design course for both electrical engineering (EE) and engineering and applied science (EAS) students. This course is for all transfer engineering students who have not taken EE 2726 at SPU. Introduction to the SPU engineering program. Provides instruction on the software and hardware that is utilized in the labs at Seattle Pacific University, which is normally covered in beginning classes. Included is the development of a Web-based student portfolio and the discussion of a Christian worldview and its implications for engineers. Attribute: Upper-Division.

EE 3000 ENGINEERING SEMINAR (1) This course is for all EAS third-year students and is preparation for the particular EAS option. It will include seminars and small-group discussions on topics related to the various EAS upper-division topics and on the engineering mission statement. Attribute: Upper-Division.

EE 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 study of separation, spectroscopic and electrochemical methods, includes engineering and clinical applications. Course equivalent: CHM 3226. Attribute: Upper-Division.

EGR 3391 MECHANICS OF MATERIALS (4) Prerequisites: CSC 1230 and EGR 2891. Study of stress and strain, properties of materials, axial load, torsion, bending, shear, combined loads, design of beams and shafts. Attribute: Upper-Division.


EGR 3402 INTRODUCTION TO ENGINEERING II (2) Required for all transfer engineering students who have not taken EE 2726 at SPU. Introduction to the SPU engineering program. Provides instruction on the software and hardware that is utilized in the labs at Seattle Pacific University, which is normally covered in beginning classes. Included is the development of a Web-based student portfolio and the discussion of a Christian worldview and its implications for engineers. Attribute: Upper-Division.

EGR 3600 ENVIRONMENTAL ENGINEERING (5) Prerequisites: CHM 1211, BIO 2101. Studies the fundamentals of air- and water-quality systems: filters, scrubbers and precipitators, control of volatile organic compounds, gaseous emissions, particulate matter, waste water, and solid and hazardous wastes, environmental toxicity and industrial health and safety issues. Attribute: Upper-Division.

EGR 3650 ALTERNATIVE ENERGIES (5) Prerequisite: EE 2726. Introduces different energy sources and investigates methods to convert this energy into a useful form. Energy sources that are investigated, designed, built and tested include solar, hydro, wind, biomass, hydrogen fuel cell and water purification. Includes examples of the use of each of these power sources. Attribute: Upper-Division.

EGR 3730 ENGINEERING DESIGN (5) Prerequisite: EE 3722. An interdisciplinary design course for both electrical engineering (EE) and applied science (EAS) students. Team design and construction of industrial or self-designed projects. Typical EE projects require analog and digital electronic circuit design, development, construction and testing. EAS design projects require some aspect of the student’s chosen science discipline. Interdisciplinary projects are encouraged. All projects require oral and written reports. Includes review and analysis of professional papers within a student’s discipline. Continues sequence of non-technical aspects of engineering, cover decision economics and career planning. Includes interactive activities with business students. Course equivalent: EE 3730. Attributes: Upper-Division; and Writing Course.

Engineering Courses

EGR 1125 ENGINEERING STUDY PREPARATION (1) Required for all freshmen engineering non-honors students unless they receive a waiver from the results of the math test given the first week in calculus. Designed to provide additional skill sets in math and science problem solving, test taking and study habits. Student will develop an individualized and accountable study/work plan to insure engineering success. Will be repeated for credit each of the first three quarters unless a score of B- or better is achieved in the previous quarter’s math class. May be repeated for credit in the sophomore year. May be repeated for credit up to 5 credits.

EGR 1402 INTRODUCTION TO ENGINEERING I (1-2) Required for all freshmen engineering students. This course is an introduction to the engineering career field and includes guest speakers from industry, reports of student internships and development of a Web-based student portfolio.

EGR 1901 AUTOCAD (1-2) This course studies the fundamentals needed to use AutoCAD programs.

EGR 2391 INTRODUCTION TO MATERIALS SCIENCE (5) Prerequisites: MAT 1228. Studies crystalization, diffusion, heat treatment and other atomic and electrical processes in metals, ceramics, polymers and composites to aid in material selection for various engineering applications.

EGR 2891 STATICS (4) Prerequisite: PHY 1121. Studies vector forces and their analysis, equilibrium of particles and of rigid bodies, structural analysis, distributed forces, and internal forces on beams and cables.

EGR 3000 ENGINEERING SEMINAR (1) This course is for all EAS third-year students and is preparation for the particular EAS option. It will include seminars and small-group discussions on topics related to the various EAS upper-division topics and on the engineering mission statement. Attribute: Upper-Division.

EGR 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 study of separation, spectroscopic and electrochemical methods, includes engineering and clinical applications. Course equivalent: CHM 3226. Attribute: Upper-Division.

EGR 3391 MECHANICS OF MATERIALS (4) Prerequisites: CSC 1230 and EGR 2891. Study of stress and strain, properties of materials, axial load, torsion, bending, shear, combined loads, design of beams and shafts. Attribute: Upper-Division.


EGR 3402 INTRODUCTION TO ENGINEERING II (2) Required for all transfer engineering students who have not taken EE 2726 at SPU. Introduction to the SPU engineering program. Provides instruction on the software and hardware that is utilized in the labs at Seattle Pacific University, which is normally covered in beginning classes. Included is the development of a Web-based student portfolio and the discussion of a Christian worldview and its implications for engineers. Attribute: Upper-Division.

EGR 3600 ENVIRONMENTAL ENGINEERING (5) Prerequisites: CHM 1211, BIO 2101. Studies the fundamentals of air- and water-quality systems: filters, scrubbers and precipitators, control of volatile organic compounds, gaseous emissions, particulate matter, waste water, and solid and hazardous wastes, environmental toxicity and industrial health and safety issues. Attribute: Upper-Division.

EGR 3650 ALTERNATIVE ENERGIES (5) Prerequisite: EE 2726. Introduces different energy sources and investigates methods to convert this energy into a useful form. Energy sources that are investigated, designed, built and tested include solar, hydro, wind, biomass, hydrogen fuel cell and water purification. Includes examples of the use of each of these power sources. Attribute: Upper-Division.

EGR 3730 ENGINEERING DESIGN (5) Prerequisite: EE 3722. An interdisciplinary design course for both electrical engineering (EE) and engineering and applied science (EAS) students. Team design and construction of industrial or self-designed projects. Typical EE projects require analog and digital electronic circuit design, development, construction and testing. EAS design projects require some aspect of the student’s chosen science discipline. Interdisciplinary projects are encouraged. All projects require oral and written reports. Includes review and analysis of professional papers within a student’s discipline. Continues sequence of non-technical aspects of engineering, cover decision economics and career planning. Includes interactive activities with business students. Course equivalent: EE 3730. Attributes: Upper-Division; and Writing Course.
EGR 3800 BIOMEDICAL ENGINEERING I (5) Prerequisites: BIO 2101 and EE 2726, or special permission of instructor. Introduction to the history of biomedical engineering, biosensors, biologic electrical phenomena, bioinstrumentation, biosignal processing, biomechanics, cardiovascular mechanics and ultrasound.

EGR 3841 DYNAMICS (5) Prerequisites: MAT 1228, MAT 2401, and either PHY 1101 or PHY 1121. Study of vectorial treatment of Newton’s laws for undamped and damped linear, rotational and vibrational motion in several coordinate systems. Includes solving problems for particles and rigid bodies using energy, momentum and angular momentum conservation laws. A team project and labs are included. Course equivalent: PHY 3841.

EGR 3871 FLUID MECHANICS (5) Prerequisites: MAT 1228, MAT 2401 and PHY 1123. Studies fluid mechanics, both statics and dynamics. Emphasis is on the control volume approach, covering the transport of mass, energy, momentum and angular momentum, with engineering applications. Offered on demand.

EGR 4311 ENGINEERING SENIOR DESIGN LAB (5) Prerequisite: EGR 4940. Intended for EAS students only. Individualized or group senior project based on internship experience. Includes instruction on design and appropriate use of technology. Attribute: Upper-Division.

EGR 4352 CELL BIOLOGY (5) Prerequisites: BIO 3325 and CHM 2371. Examines structure and functions of bacteria, plants and animals emphasizing cellular specialization, organelle models and chemical dynamics. Includes laboratory. Course equivalent: BIO 4352. Attributes: Upper-Division; and Writing Course.

EGR 4740 INTERNSHIP PREPARATION (1) Preparatory course for those taking EGR 4940, Engineering Internship. Includes resume preparation, interviewing, skill development, exploration of job opportunities, oral presentation and discussion of the Christian worldview on the internship experience. Attributes: Upper-Division; and Writing Course.

EGR 4900 INDEPENDENT STUDY IN ENGINEERING (1-5) Registration approval. Independent Study Agreement. Student does an independent study under direction of a faculty member. Study of problems in a topic for which related courses have been completed. May be repeated for credit up to 15 credits. Attribute: Upper-Division.

EGR 4910 WASHINGTON STATE FE/ET PREPARATION (1) Registration approval. Engineering faculty. Seminar review of principles and problem solving in math, chemistry, physics, electrical engineering, engineering science and engineering economics in the proportions these topics are covered in the Washington state EIT test. Attribute: Upper-Division.

EGR 4930 ENGINEERING APPLICATIONS IN INDUSTRY (1-10) Registration approval. Engineering Faculty. Provides pre-arranged coordinated field experience in engineering employment in industry. A coordinating committee plans the program with the student and evaluates the learning experience. May be repeated for credit up to 10 credits. Attribute: Upper-Division.

EGR 4940 ENGINEERING INTERNSHIP (1-5) Internship I is normally a paid summer job with an engineering company or a university research lab. Other career-related work experiences may be considered. Students will give a written and oral presentation of their work following the Autumn Quarter. The job is fully coordinated between the intern’s faculty advisor and the employer in the host company. The jobs are intended to be a professional learning experience for the student. May be repeated for credit up to 5 credits. Attributes: Upper-Division; and Writing Course.


Faculty
Kevin W. Bolding, Associate Professor of Computer and Electrical Engineering; B.A., Rice University, 1988; M.S., University of Washington, 1991; Ph.D., 1993. At SPU since 1995.

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English
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Courses in English give students the opportunity to read a rich variety of excellent literature and to improve their own writing and thinking. Literature courses show how language enables us to explore and shape our views of God, humanity and the earth; writing courses stress writing as a process of communication with readers and as an exploration of one’s own ideas and emotions.

Courses in English also allow students to discuss the fundamental questions of human life and meaning, as well as to cultivate an appreciation of individual and cultural diversity. An English major prepares students to enter professions such as the ministry, law, social work or medicine; to work in a variety of businesses and governmental agencies; to teach in elementary or