Fashion Institute of Design and Merchandising (FIDM) Program
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
Students in the textiles 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.

Requirements for the Art Major
Emphasis in Studio Arts
(68 credits; 34 upper division)
Core Courses
Art 1102, 1103, 1104 Drawing Studio ........................................ 9
Art 1202, 1203, 1204 Design Studio ........................................ 9
Art 2302 Painting Studio, Oil or Acrylic ................................. 3
Art 2722 Sculpture Studio .................................................... 3
Art 2421 Printmaking Studio ............................................... 3
Art 2428 Ceramics Studio ................................................... 3
Art 2422 Metals Studio ...................................................... 3
Art 2421 Printmaking Studio ............................................... 3
Art 2302 Painting Studio, Oil or Acrylic ................................. 3
Art 2722 Sculpture Studio .................................................... 3
Art 2421 Printmaking Studio ............................................... 3
Art Electives
Art 3112 Figure Drawing ................................................... 3
Art 4112 Figure Drawing - Advanced ................................ 3
Art 2428 Ceramics Studio ................................................... 3
Art 2422 Metals Studio ...................................................... 3
Art History (3 quarters of study required) .......................... 15
Art 4236 Portfolio ............................................................. 1
Art 4910 Senior Seminar and Exhibition ............................ 1
Art 4966 Senior Studio Project ............................................ 3
Art Electives
(4 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
(71 credits; 44 upper division)
Core Courses
Art 1102, 1103, 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 2202 Image Capture ....................................................... 3
Art 2208 Typography ............................................................ 3
Art 2502 Illustration ............................................................ 3
Art 3302 Visual Communication (Beginning Print) .................. 3
Art 3304 Visual Communication (Advanced Print) .................. 3
Art 3306 Information Architecture (Beginning Web) .............. 3
Art 3502 Illustration, Advanced ............................................ 3
Art 3609 History of Graphic Design .................................... 5
Art 4208 Interactive Media 1 ................................................. 3
Art 4210 Interactive Media 2 ................................................. 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, 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 THE VISUAL ARTS (3) 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. Co requisite: ART 1181. Attributes: Arts and Humanities A and Fine Arts Core.

ART 1181 THE VISUAL ARTS LAB (2) Studio-oriented experience consisting of a series of basic exercises using visual elements and principles of art to create works of art. Corequisite: ART 1180. 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 arts 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 2201 INTRODUCTION TO COMPUTER ART (3) Prerequisites: ART 1102, 1103, 1202, 1203 and 1204. Overview and exploration of the rudimentary use of digital media as it relates to the production of visual communications. Extra fee. Registration Approval: Instructor.

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 open to freshmen.


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) Explores the design and construction of pottery. Projects include several hand-building processes of construction, glazing and loading and firing the kiln. Emphasizes hand building. Extra fee. Attributes: Arts and Humanities A and Fine Arts Option. Class not open to freshmen.

ART 2429 ILLUSTRATION (3) Prerequisites: ART 1102, 1103 and 1104. Introduction to the various problems, materials and techniques and processes utilized in professional illustration. Extra fee.

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

ART 3112 DRAWING STUDIO - FIGURE (3) Registration Approval: Instructor. Prerequisites: ART 1102, 1103, 1104. Studies the problems of anatomical structure with sketching and drawing from the draped model. Extra fee. Attribute: Upper Division. Class open to art majors. Class not open to freshmen.

ART 3202 VISUAL COMMUNICATION I (3) Registration Approval: Instructor. Prerequisites: ART 2201, 2202, 2208. Exploration of creative ideas, resources, digital processes, media and terminology in the development of visual communication solutions. Extra fee. Attribute: Upper Division. Class open to art majors. Class not open to freshmen and sophomores.

ART 3204 VISUAL COMMUNICATION II (3) Registration Approval: Instructor. Prerequisite: ART 3202. Continues exploration of termination, 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) Prerequisite: ART 2302 or permission of instructor. Emphasizes individual expression and the study of styles in various subject matter. Extra fee. Attribute: Upper Division. Class not open to freshmen.

ART 3315 PAINTING STUDIO - WATERCOLOR (3) Investigates a range of technical skills in the use of traditional watercolor. Attribute: Upper Division.

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

ART 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 ILLUSTRATION - ADVANCED (3) Prerequisite: ART 2502. Continued work in illustration as a form of graphic communication with emphasis on advanced media techniques and conceptual development. Extra fee. May be repeated for credit one time. Attribute: Upper Division. 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 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. 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) 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) Examines the art forms of Japan, Korea, China, India and Indian Asia. Offered alternate years. Attributes: Arts and Humanities A, Fine Arts Option and Upper Division. Class not open to freshmen and sophomores.

ART 3607 HISTORY OF AMERICAN ART (5) Provides a survey of American art from Colonial times to the present, covering architecture, painting and sculpture. Offered alternate years. Attributes: Arts and Humanities A, Fine Arts Option and Upper Division. Class not open to freshmen 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/artists act as vehicles for investigation. Attributes: Upper Division and Writing Course. Class open to art majors. Class not open to freshmen and sophomores.

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

ART 3723 SCULPTURE STUDIO - ADVANCED II (3) Registration Approval: Instructor. Prerequisite: ART 3722 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 open to art majors. Class not open to freshmen and sophomores.

ART 3912 MEMORY DRAWING - ADVANCED (3) Registration Approval: Instructor. Prerequisites: ART 2102, 3102, 3104 and 3112. Offered alternate years. May be repeated for credit up to 6 credits. Attribute: Upper Division. Class open to freshmen and sophomores.


ART 4212 MOTION GRAPHICS (3) Registration Approval: Instructor. Prerequisite: ART 4210. Explorations 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) Instructor. Extra credit one time. Attributes: Upper Division and Writing Course. 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 printmaking media, including woodcut, serigraph and collagraph. Extra fee. May be repeated for credit one time. Attribute: Upper Division. Class not open to freshmen and sophomores.

ART 4422 METALS STUDIO - ADVANCED II (3) Prerequisites: ART 2422, 3422 or permission of instructor. Teaches the raising, soldering and forging of metals into utensils and decorative forms such as jewelry. Emphasizes casting. Extra fee. May be repeated for credit two times. Attribute: Upper Division. Class not open to visual arts majors. Class open to juniors and seniors.

ART 4428 CERAMICS STUDIO - WHEEL II (3) Prerequisite: ART 3428 or permission of instructor. Studies in development of appropriate skill base. Extra fee. May be repeated for credit up to 6 credits. Attribute: Upper Division. Class open to art majors. Class not open to freshmen and sophomores.

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. 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 (1)

Prerequisite: Senior standing in the major. A faculty member on Department of Biology collaborates with the student to plan and execute the senior exhibition. 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 4920 READINGS IN ART (1-5)** Registration Approval: Independent Study Agreement. May be repeated for credit up to 15 credits. Attributes: Upper Division and Writing Course. Class open to visual arts majors. Class not open to freshmen, sophomores and juniors.

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

**ART 4950 SPECIAL TOPICS IN ART (1-5)** Registration Approval: Instructor. May be repeated for credit up to 15 credits. Attribute: Upper Division. Class open to visual arts majors. Class not open to freshmen, sophomores and juniors.

**ART 4966 SENIOR STUDIO PROJECT (1)** Senior self designs and completes over the academic year a visual arts project that will form the core of the work they display in the Senior Exhibition. Students must register for this course for each quarter of their senior year. May be repeated for credit up to 5 credits. Attribute: Upper Division. Class open to fine and applied arts and visual arts majors. Class not open to freshmen, sophomores and juniors.

**ART 4980, ART 4981 and ART 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 (ART 4978 Biological Research Proposal), and original research and presentation of results (ART 4979).

**Faculty**


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

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**Biochemistry**

See Chemistry

**Biology**

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

Richard L. Ridgway, Chair, Cindy Bishop, Bruce Congdon, Cynthia L. Fitch, A. Kenneth Moore, Timothy Nelson

The Department of Biology has four primary goals: (1) We seek to promote the scientific study of life; (2) we work to improve communication and critical thinking in issues related to biology; (3) we strive for excellence in scientific training for those who pursue careers in scientific fields; and (4) we are committed to the development of personal integrity and wholeness in our community of faculty and students.

**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 page 64 for a summary of degree requirements.)*

**B.S. in Biology**

**Option I**

(100 credits; 35 upper division in biology)

This major provides preparation for graduate studies or professional careers in biology. It places special emphasis on undergraduate research. Depending upon interests and professional goals, a student may choose the core and elective coursework to emphasize botany, cellular and molecular biology, ecology, marine biology, physiology or zoology. In addition to the core and supporting requirements indicated below, 14 credits of biology elective courses are also required. Elective courses should be discussed with biology faculty advisors. General physics is also strongly recommended. As a part of either core requirements or electives, students are required to take a minimum of 3 credits of field biology, taught primarily in the field and emphasizing field methods. Seattle Pacific field biology courses are BIO 4117, BIO 4135, 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**

(108 credits)

This program is designed primarily for those students planning to enter a master’s degree program in physical therapy. This highly interdisciplinary curriculum will satisfy the basic requirements for entry into physical therapy as outlined by the American Association of Physical Therapists. In addition to the requirements listed below, 10 elective credits are required from the following: BIO 3325, 3434, 4256, 4413 and 4418. Other recommended courses include CHM 3225 and 3400, FCS 3340, HSC 3395, MAT 1112/1114 or 1221, PE 3590 and SOC 1110.
### Required Courses

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<thead>
<tr>
<th>Required Courses</th>
<th>BS I</th>
<th>BS II</th>
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<tr>
<td>BIO 2101 General Biology</td>
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<td>BIO 2102 General Biology</td>
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<td>BIO 2103 General Biology</td>
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<tr>
<td>BIO 2129 Anatomy and Physiology</td>
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<td>BIO 2130 Anatomy and Physiology</td>
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<td>BIO 3325 Genetics</td>
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<td>BIO 3351 General Microbiology</td>
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<td>BIO 4352 Cell Biology</td>
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<tr>
<td>BIO 4330 Evolutionary Mechanisms</td>
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### Physiology Core

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<tr>
<th>Physiology Core (BIO 4413 or BIO 4415)</th>
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### Comparative Biology Core

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<tr>
<th>Comparative Biology Core (BIO 3320, BIO 3432, BIO 3453, BIO 3456, BIO 4435, BIO 4740, or BIO 4744)</th>
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### Ecology Core

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<tr>
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### Field Biology Requirement

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<tr>
<th>Field Biology Requirement (A minimum of 3 credits)</th>
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### Undergraduate Research

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<tr>
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### Electives

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### Required supporting course

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<th>Required supporting course (CHM 1211 General Chemistry)</th>
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<tbody>
<tr>
<td>CHM 2371 Organic Chemistry</td>
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<tr>
<td>CHM 2372 Organic Chemistry</td>
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<tr>
<td>CHM 2373 Organic Chemistry</td>
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<tr>
<td>CHM 3225 Chemical Equilibrium and Analysis</td>
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<tr>
<td>CHM 3226 Quantitative and Instrumental analysis or</td>
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<tr>
<td>CHM 3400 Physical Chemistry for the Life Sciences or</td>
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<tr>
<td>CHM 3540 Introductory Inorganic Chemistry or</td>
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<tr>
<td>BIO 4360 Statistical Inference in Biological Research</td>
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<tr>
<td>MAT 1221 Survey of Calculus or MAT 1225 and 1226 Calculus</td>
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<tr>
<td>MAT 1360 Statistics or HSC 4044 Biomed Tests,</td>
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<td>Measurements and Stats</td>
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<td>CSC 1121 and two of the following: CSC 1122, CSC 1123,</td>
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<td>CSC 1124, and CSC 1126</td>
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<tr>
<td>PE 3570 Biomechanics</td>
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<td>PE 3580 Exercise Physiology</td>
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### Required Courses

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<tr>
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<tr>
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### Ecology Core

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### Comparative Biology Core

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### Physiology Core

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### Electives

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### Required supporting courses

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<th>BA II</th>
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<tbody>
<tr>
<td>CHM 1211 General Chemistry</td>
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*No more than 6 credits of BIO 4950 or 5 credits in BIO 4900, 4930, 4940, 4978 or 4979 may be applied to a B.S. degree in biology.*

### B.A. in Biology

#### Option I

(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 Programs.”

#### Option II

(78 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.

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86 Biology
BIO 4825 Forest Ecology (5)  
BIO 4950 Special Studies in Biology (3)  
BIO 4981 Marine Ecology (9)  

Total ................................................. 120  

34-38

87

BIOLOGY Courses

BIO 1100 BIOLOGICAL SCIENCE (5) Intended for non-biology majors. Emphasis varies quarterly: human nutrition, human biology, environmental biology, biological diversity or marine biology. Basic concepts include the chemistry of living things, their structure and function, and their interactions with the environment. Applications to current issues are considered from a Christian perspective. No credit will be given for students who have taken BIO 2101, 2102, 2103, 2129, 2130 or who have advanced placement biology credit. Also offered at Blakely Island Field Station and as a study tour. Attributes: Biological Sciences and Natural Science A.

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

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

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

BIO 2129 HUMAN ANATOMY AND PHYSIOLOGY (5) Studies the structure and function of the human organism. Includes cells and membranes, 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 3310 ECOLOGY (5) Prerequisites: BIO 2103 and MAT 1360 or HSC 4044. Explores the factors and mechanisms responsible for population dynamics, community structure and the function of ecosystems. Includes laboratory. Attributes: Upper Division and Writing Course.

BIO 3320 PRINCIPLES OF DEVELOPMENT (5) Prerequisites: BIO 2102 or equivalent, and MAT 1360 or HSC 4044. 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. Attributes: 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. Attributes: Upper Division and Writing Course.

BIO 3350 IMMUNOLOGY (3) Prerequisites: BIO 2101 or 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 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 3425 MOLECULAR BIOLOGY (5) Registration Approval: Instructor. Prerequisites: BIO 2101, 3325. Explores 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, genetic engineering, gel electrophoresis, PCR and sequencing. Advanced topics in molecular biological research will be presented. Includes laboratory. Offered alternate years. Attribute: Upper Division.

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 systems, history and extinction. Includes discussion of microevolutionary and macroevolutionary changes. Attribute: Upper Division. Class not open to non-matriculated students.

BIO 4392 CELL BIOLOGY (5) Prerequisites: BIO 3325 and CHM 2371. Examines structure and function 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: MAT 1360 and BIO 2103. 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 analysis of variance and covariance; chi square tests; nonparametric procedures multiple and curvilinear regression; experimental design powers of tests; and use of computer programs in standard statistical problems. 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. Offered alternate years. Attribute: Upper Division.

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 nervous system structure and function. Laboratory makes extensive use of invertebrate models to examine the cellular basis of behavior, including neuronal morphology, electrophysiology and transmitter chemistry. Includes laboratory. Offered alternate years. Attribute: Upper Division.

BIO 4420 HISTOLOGY AND MICROSCOPIC TECHNOLOGY (5) Prerequisites: BIO 2102, CHM 2372. Examines microscopic anatomy of cells, tissues and organsystems, examining their structure and the morphological evidences of their function. Emphasizes human histology. Includes laboratory. Offered alternate years. Attribute: Upper Division.

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

BIO 4478 BIOLOGICAL RESEARCH PROPOSAL (1-5) Registration Approval: Instructor. The student will prepare a proposal including a literature review and methods description for a biological research project. Attribute: Upper Division.

BIO 4479 BIOLOGICAL RESEARCH (1-5) Registration Approval: Intern Learning Contract Req. Provides a significant learning experience under faculty supervision in a work-study environment either on or off campus. May be repeated for credit up to 6 credits. Attribute: Upper Division.

BIO 4900 INTERNSHIP IN BIOLOGY (1-5) Registration Approval: Intern Learning Contract Req. Provides a significant learning experience under faculty supervision in a work-study environment either on or off campus. May be repeated for credit up to 5 credits. Attribute: Upper Division.

BIO 4950 SPECIAL STUDIES IN BIOLOGY (1-5) Registration Approval: Travel Studies Form. Provides selected field study topics offered at Biology Department's discretion: Hawaiian marine biology; Caribbean marine biology; Sonoran desert biology; alpine flora. May be repeated for credit up to 6 credits. Attribute: Upper Division.

BIO 4978 BIOLOGICAL RESEARCH PROPOSAL (1-5) Registration Approval: Instructor. The student will prepare a proposal including a literature review and methods description for a biological research project. Attribute: Upper Division.

BIO 4979 BIOLOGICAL RESEARCH (1-5) Registration Approval: Instructor. Prerequisite: BIO 4978. The student will conduct research based on a proposal prepared prior to registering for this course. Results of the research will be presented at undergraduate or professional symposia. May be repeated for credit up to 4 credits. Attribute: Upper Division.

Faculty

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

Bruce D. Congdon, Professor of Biology; Director of Blakely Program; B.S., College of the Ozarks, 1979; M.S., Colorado State University, 1981; Ph.D., University of California, Riverside, 1985. At SPU since 1985.
Biotechnology
Miller Science Learning Center (MSLC)
Voice Mail: (206) 281-2002

Rick Ridgway, Director, Cynthia Fitch
One of the pillars of entrepreneurial growth in science is biotechnology. It has been identified as one of the most important applied sciences of the 21st century. This emergent discipline embraces the disciplines of biochemistry, molecular biology, genetics, cell biology and computer science/mathematical modeling. It has been argued that this will lead to a new discipline where technology and biology are driving each other. A dramatic example of this is the Human Genome Project, genetic manipulation for medical therapy. This knowledge can eventually lead to extended and expansive practice of what is termed preventative medicine (i.e., identification of genes predisposing to disease and the use of therapies to avoid or lessen disease).

The Seattle area is one of the leaders in biotechnology, with nearly 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 is being designed. The program uses existing courses in biology and chemistry but with some special emphases. The initial phase of this program was introduced in 1997-1998. One of the ways to enable students in this professional quest is to have them develop a portfolio. The portfolio will include the following:

1. Evaluation forms that reflect development of both theory content and laboratory skills (done with the use of a pre-test/post-test instrument to see if the curriculum leads to desired skills);
2. An assessment of the practicals done in lab (each designated student will have a report filed during each course);
3. A student-volunteer teaching report (each student will do volunteer teaching work in a K-12 classroom over a period of one or two terms); and
4. Internship evaluation at a local biotechnology firm (each student will engage in a one- or two-term working internship at a local research lab. This work may be extended to a senior thesis project). This portfolio then becomes an asset that students can carry forward to their professional activities.

Course Requirements
The biotechnology program is framed within existing majors in biology, biochemistry and chemistry. The core courses for the program are as follows:

- BIO 3325 Genetics (5)
- BIO 4325 Molecular Biology (5)
- BIO 4352 Cell Biology (5)
- CHM (BIO) 4361, 4362 Biochemistry (5 each)
- CHM/BIO 4363 (3)

Recommended Courses
- CHM 3226 Quantitative and Instrumental Analysis (5)
- BIO 3350 Immunology (3)

The internship component of the program is satisfied by the following:

- CHM 4940 Internship in Chemistry (1-5)
- BIO 4940 Internship in Biology (1-5)

Blakely Island Field Station
Blakely Island, Washington
(206) 281-2899
www.spu.edu/depts/biology/blakely

Bruce Congdon, 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
Blakely Island Courses

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, library research and laboratory study. Offered alternate years at the Blakely campus. Extra fee. Attribute: Upper Division.


BIO 4740 MARINE INVERTEBRATE ZOOLOGY (5) Prerequisite: BIO 2102. Provides a field and laboratory course emphasizing identification, life histories, habitats and interrelationships of marine invertebrates from Puget Sound. Includes laboratory. Offered in summer at Blakely Island. Extra fee. Attribute: Upper Division.

BIO 4744 MARINE BOTANY (5) Prerequisite: BIO 2103. Provides a field and laboratory course emphasizing identification, life histories, habitats and interrelationships of marine plants with emphasis on local flora and Blakely Island. Includes laboratory. Normally taught in summer at Blakely Island. 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 found on Blakely Island. Extra fee. Attribute: Upper Division. Class open to non-matriculated and undergraduate levels.

BIO 4820 ECOMORPHOLOGY (5) Prerequisite: BIO 2102. A field course providing 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 at Crowley Laboratory on Blakely Island. Attribute: Upper Division.

BIO 4825 FOREST ECOLOGY (5) Prerequisite: BIO 2103. Examines the organisms that comprise the forest ecosystem and their interaction with the physical environment. Emphasis will be placed on field study of forest community composition, and the forest as a biologically modified habitat. 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. Attribute: Upper Division.

BIO 4880 BLAKELY FIELD STUDIES (1-5) Provides a field learning experience focusing on a single aspect of the Blakely Island environment, such as fresh water, marine or terrestrial habitats. 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. Symbioses, predation, herbivory and interactions with the physical environment will be emphasized. Laboratory and fieldwork 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. Extra fee. Attribute: Upper Division. Class open to non-matriculated and undergraduate levels.
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 School of Business and Economics

Majors offered by the School of Business and Economics are accounting, business administration and economics. The business administration major offers concentrations in the following areas: (1) 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 2.70 cumulative GPA from all institutions and a minimum of 2.70 cumulative GPA in all SBE courses. 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 in McKenna Hall or students may use the online application on the SBE home page at www.spu.edu/depts/sbe.

Admission Requirements for Minors in Business Administration and Economics

To be accepted to a minor in the School of Business and Economics, the student must have attained at least sophomore standing and have achieved a minimum 2.70 cumulative GPA from all institutions. Application forms may be obtained in McKenna Hall or students may use the online application on 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 Program B.A. Program in Computer Science (Business Emphasis)

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

Ross E. Stewart, Contact Person

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 page 64 for a summary of degree requirements.) Students desiring to major in accounting must follow the application process described above. To be awarded a degree with a major in accounting, students must meet the major requirements in effect at the time declaration of a major was made and have a minimum of 45 credit hours in the major at SPU. Students who plan to obtain any of the professional designations such as certified public accountant (CPA), certified management accountant (CMA) or certified internal auditor (CIA) should contact an accounting faculty member for advising. Students who plan to take the CPA exam must have completed 225 quarter hours (equivalent to five years) of college coursework. Students may meet this requirement by earning a second bachelor’s degree, or by taking 45 additional undergraduate credits (which may be in any discipline and do not necessarily lead to a degree). However, CPA-bound students are encouraged to apply for admission to a graduate program in the School of Business and Economics, either the master of business administration (M.B.A.) or the master of science in information systems management (I.S.M.). Students interested in this program should do the following:

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

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-year freshmen.

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

ACCT 3324 FEDERAL INCOME TAXATION (3) Registration Approval: SBE Coordinator. Prerequisite: ACCT 2361. Provides an introduction to the income-tax structure and basic concepts of tax law relating to individual, corporate, partnership and estate-income taxation. Attribute: Upper Division. Class not open to freshmen.

ACCT 3325 FEDERAL INCOME TAX II (5) Registration Approval: SBE Coordinator. This is a continuation of ACCT 3324. Attribute: Upper Division. Class not open to freshmen.

ACCT 3327 COST ACCOUNTING (5) Registration Approval: SBE Coordinator. Prerequisite: ACCT 2362. Introduces basic principles of cost accounting as applied to materials, labor and manufacturing overhead. Attribute: Upper Division. Class not open to freshmen.

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:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECN 2101 Principles of Microeconomics</td>
<td>5</td>
</tr>
<tr>
<td>ECN 2102 Principles of Macroeconomics</td>
<td>5</td>
</tr>
<tr>
<td>BUS 2414 Legal Environment of Business</td>
<td>5</td>
</tr>
</tbody>
</table>

Core requirements to be completed during the sophomore year:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 2361 Financial Accounting</td>
<td>5</td>
</tr>
<tr>
<td>ACCT 2362 Managerial Accounting</td>
<td>5</td>
</tr>
<tr>
<td>BUS 3250 Business Finance</td>
<td>5</td>
</tr>
<tr>
<td>BUS 2600 Managerial Communication</td>
<td>2</td>
</tr>
<tr>
<td>BUS 2700 Statistics For Business and Economics</td>
<td>5</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 3400 Business Ethics</td>
<td>5</td>
</tr>
<tr>
<td>BUS 3614 Organizational Behavior</td>
<td>5</td>
</tr>
<tr>
<td>BUS 3541 Marketing and Society</td>
<td>5</td>
</tr>
<tr>
<td>BUS 3700 Quantitative Methods for Decision Making or BUS 3710 Optimization and Statistics</td>
<td>3</td>
</tr>
<tr>
<td>BUS 4644 Operations Management</td>
<td>5</td>
</tr>
<tr>
<td>BUS 4690 Strategic Management</td>
<td>5</td>
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</tbody>
</table>

These requirements should be completed during the junior or senior year:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 3620 Management Information Systems</td>
<td>5</td>
</tr>
</tbody>
</table>

Accounting Core Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 3327 Cost Accounting</td>
<td>5</td>
</tr>
<tr>
<td>ACCT 3351 Intermediate Accounting I</td>
<td>5</td>
</tr>
<tr>
<td>ACCT 3352 Intermediate Accounting II</td>
<td>5</td>
</tr>
<tr>
<td>ACCT 3353 Intermediate Accounting III</td>
<td>5</td>
</tr>
<tr>
<td>ACCT 4362 Accounting Theory and Problems</td>
<td>5</td>
</tr>
<tr>
<td>ACCT 3324 Federal Income Taxation</td>
<td>3</td>
</tr>
<tr>
<td>ACCT 3328 Auditing</td>
<td>3</td>
</tr>
<tr>
<td>ACCT 4351 International Accounting</td>
<td>3</td>
</tr>
</tbody>
</table>

Total ................................................................................ 104
ACCT 3328 AUDITING (3) Registration Approval: SBE Coordinator. Prerequisite: ACCT 3352. Teaches auditing theory and concepts to gather and evaluate evidence supporting an entity’s financial statements. Attribute: Upper Division. Class not open to freshmen and sophomores.


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

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


ACCT 4362 ACCOUNTING THEORY AND PROBLEMS (5) Registration Approval: SBE Coordinator. Prerequisite: ACCT 3353. Critically examines problem areas of current interest in financial accounting. Emphasizes investigating the “whys” 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.

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

ACCT 4940 INTERNSHIP (1-5) Registration Approval: Intern Learning Contract Req. Provides field-experience opportunities for students to relate and apply principles of business, faith, service and leadership to a professional business setting. Course consists of (1) an internship in a professional business setting (minimum of 10 hours/week) and (2) an on-campus seminar. Internship placement must be arranged the quarter prior to registration. Additional information may be obtained from the Career Development Center or internship coordinator for the School of Business and Economics. May be repeated for credit up to 10 credits. Course Equivalent: BUS 4940. Attribute: Upper Division. Class not open to freshmen and sophomores.

**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 page 64 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.

### Core requirements to be completed by first quarter of sophomore year:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>ECN 2101</td>
<td>Principles of Microeconomics</td>
<td>5</td>
</tr>
<tr>
<td>ECN 2102</td>
<td>Principles of Macroeconomics</td>
<td>5</td>
</tr>
<tr>
<td>BUS 2414</td>
<td>Legal Environment of Business</td>
<td>5</td>
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</table>

### Core requirements to be completed during the sophomore year:

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<tr>
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<tbody>
<tr>
<td>ACCT 2361</td>
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<td>ACCT 2362</td>
<td>Managerial Accounting</td>
<td>5</td>
</tr>
<tr>
<td>BUS 3250</td>
<td>Business Finance</td>
<td>5</td>
</tr>
<tr>
<td>BUS 2600</td>
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<td>2</td>
</tr>
<tr>
<td>BUS 2700</td>
<td>Statistics for Business and Economics</td>
<td>5</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 3400</td>
<td>Business Ethics</td>
<td>5</td>
</tr>
<tr>
<td>BUS 3614</td>
<td>Organizational Behavior</td>
<td>5</td>
</tr>
<tr>
<td>BUS 3541</td>
<td>Marketing and Society</td>
<td>5</td>
</tr>
<tr>
<td>BUS 3700</td>
<td>Quantitative Methods for Decision Making</td>
<td>5</td>
</tr>
<tr>
<td>BUS 3710</td>
<td>Optimization and Statistics</td>
<td>3</td>
</tr>
<tr>
<td>BUS 4644</td>
<td>Operations Management</td>
<td>5</td>
</tr>
<tr>
<td>BUS 4690</td>
<td>Strategic Management</td>
<td>5</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 3620</td>
<td>Management Information Systems</td>
<td>5</td>
</tr>
<tr>
<td>BUS 3828</td>
<td>International Business</td>
<td>5</td>
</tr>
<tr>
<td>BUS 4940</td>
<td>Internship</td>
<td>2</td>
</tr>
</tbody>
</table>
In addition to the general core, students must take 15 credits in one of the following concentrations:

**E-commerce Concentration**
- BUS 3631 Entrepreneurship ........................................... 5
- BUS 3625 E-Commerce and the Networked World ............ 5
- BUS 4625 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 ................ 5
- BUS 4620 Computer Networks ....................................... 5
- BUS 4622 Information and Database Systems ................. 5

**International Business Concentration**
- THEO 3610: Living in Another Culture, or THEO 3640: Cross-Cultural Communication ............. 3
- BUS 3830: International Business Seminar .................... 3
- Approved courses at a university outside the United States, arranged through the School of Business and Economics study abroad program ............................................. 9

**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

**International Business Concentration**

In addition to the general core, students must take 15 credits in one of the following concentrations:

**E-commerce Concentration**
- BUS 3631 Entrepreneurship ........................................... 5
- BUS 3625 E-Commerce and the Networked World ............ 5
- BUS 4625 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 ................ 5
- BUS 4620 Computer Networks ....................................... 5
- BUS 4622 Information and Database Systems ................. 5

**International Business Concentration**
- THEO 3610: Living in Another Culture, or THEO 3640: Cross-Cultural Communication ............. 3
- BUS 3830: International Business Seminar .................... 3
- Approved courses at a university outside the United States, arranged through the School of Business and Economics study abroad program ............................................. 9

**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

**International Business Concentration**

Students interested in the international business concentration need to contact the SBE office at (206) 281-2970 for information about the SBE study abroad program.

In addition, students completing the international business concentration need at least 15 credits of foreign language study beyond the minimum 15 credits required for graduation.

**Requirements for the Minor in Business Administration**

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

**Business Courses**

**BUS 1100 INTRODUCTION TO FINANCIAL MANAGEMENT**
- Registration Approval: Instructor. Studies the key areas of financial management in the firm. These include financial markets, internal and external sources of funds, working capital management, capital budgeting, valuation and financial forecasting. Class open to non-matriculated students.

**BUS 1700 SPREADSHEETS (1)**

**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)**

**BUS 3250 BUSINESS FINANCE (5)**
- Registration Approval: SBE Coordinator. Prerequisite: ACCT 2361. 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 and economics majors. Class not open to freshmen.

**BUS 3400 BUSINESS ETHICS (5)**
- Registration Approval: SBE Coordinator. Prerequisite: UPDN 2000 or equivalent. Explores various ethical theories and their application to the practice of business. Gives particular emphasis to Christian ethics and focuses on individual ethical decision making. Attribute: Upper Division. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences, and textiles, clothing and interiors majors. Class not open to freshmen.

**BUS 3414 BUSINESS LAW (5)**
- Studies the key areas of business law. Focuses on individual ethical decision making. Attribute: Upper Division. Class not open to freshmen.

**BUS 3439 MOTIVATION AND LEADERSHIP (5)**
- Registration Approval: SBE Coordinator. Prerequisite: BUS 3614 or PSY 1180. Presents the theories and principles of motivation and leadership with practical application in business, church, community and educational settings. Course Equivalent: PSY 3439. Attribute: Upper Division. Class not open to organizational behavior and psychology majors.
BUS 3541 MARKETING AND SOCIETY (5) Studies the principles of marketing, employs a systems approach to examine the impact of marketing on the quality of life. Considers both macro and micro dimensions of marketing. Attribute: Upper Division and Writing Course. Class not open to freshmen.

BUS 3542 MARKETING RESEARCH (5) Registration Approval: SBE Coordinator. Prerequisites: BUS 2700. Focuses on the marketing research process, including preliminary steps and research design, questionnaires, secondary and primary data, sampling, processing and interpreting data, evaluation and effective presentation of findings. Attribute: Upper Division. Class open to business and economics majors. Class not open to freshmen.

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


BUS 3546 INTERNATIONAL MARKETING (5) This course examines the theory and application of international marketing from a global, rather than a U.S.-centered viewpoint. International management issues are examined both from the perspective of small and mid-sized businesses, as well as multinational firms. The course also focuses on ethical issues concerning the global diversity of customs and morals, environmental issues and the impact of trade. This course is offered online. Attribute: Upper Division. Class not open to freshmen and sophomores.

BUS 3614 ORGANIZATIONAL BEHAVIOR FOR MANAGERS (5) An introduction to theory, research and practice related to the management of human behavior in an organizational context. Course topics include individual characteristics, motivation, learning, communication, leadership, decision making, group dynamics, conflict, power and politics. The course involves significant group activities and requires multiple oral presentations. Attribute: Upper Division. Class open to accounting, business administration, computer science, 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 and sophomores.

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 hours a day/7 days a week services, networked communities, increased availability of information and 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 level. Class not open to freshmen and sophomores.

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

BUS 3657 HUMAN RESOURCE MANAGEMENT (5) An introduction to the management of human resources in organizations. Theory, research and practice in the areas of human resources planning, job analysis and design, recruiting and staffing, training and development, performance appraisal, compensation, organization development, government regulation of HRM and quality of work life will be studied. Attribute: Upper Division. Class open to business 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, funding requirements, coordination and direction of volunteers, legal issues and public relations. Appropriate for those interested in the management of churches, hospitals, performing groups, social service organizations. Attribute: Upper Division. Class open to business and economics majors. Class not open to freshmen.

BUS 3700 QUANTITATIVE METHODS FOR DECISION MAKING (3) Registration Approval: SBE Coordinator. Prerequisite: BUS 2700. Uses computers for solving quantitative management decision problems. Includes optimization with derivatives, marginal analysis, linear programming and forecasting methods. Course Equivalent: BUS 3710. Attribute: Upper Division. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences, and textiles, clothing and interiors majors.

BUS 3710 OPTIMIZATION AND STATISTICS (3) Registration Approval: SBE Coordinator. Prerequisites: BUS 2700 and MAT 1221 or other previous study of calculus in high school or college. Use computers for solving quantitative management decision problems. Includes multivariable optimization, Lagrange multipliers, linear programming and forecasting methods. Course Equivalent: BUS 3700. Attribute: Upper Division. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences, and textiles, clothing and interiors majors.

BUS 3828 INTERNATIONAL BUSINESS (5) Covers the major forms of international business, including problems of licensing, production, marketing, and 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 SBE study abroad program. The course will cover current topics in international business; the specific topics will vary from year to year. Corequisite: completion of 15 credits of foreign language (or equivalent) beyond the minimum required for graduation from Seattle Pacific. Attribute: Upper Division. Class open to undergraduate level. Class not open to freshmen and sophomores.

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

BUS 4274 PROBLEMS IN CORPORATE FINANCE (5) Registration Approval: SBE Coordinator. Prerequisite: BUS 2700. Gives an in-depth treatment of the more critical aspects of financial decision making introduced in BUS 3250, utilizing lectures and case studies. Topics typically include mergers and acquisitions, forecasting and cash budgeting, valuation techniques and capital structure issues. Attribute: Upper Division. Class open to business and economics majors. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences, and textiles, clothing and interiors majors. Class not open to freshmen.
BUS 4275 THE PRACTICE OF FINANCE (5) Registration Approval: SBE Coordinator. Prerequisite: BUS 4274. Applies tools and concepts in all phases of finance to real situations through projects and case studies. Attribute: Upper Division. Class open to business and economics majors. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences, and textiles, clothing and interiors majors. Class not open to freshmen. BUS 4542 CONSUMER BEHAVIOR (5) Registration Approval: SBE Coordinator. Prerequisite: BUS 3541. Examines how consumers make choices about what, how and when they buy. Special emphasis will be placed on integrating cognitive, behavioral and ethical concepts in the study of consumer behavior, and the relationships of consumer behavior with marketing strategies. Attribute: Upper Division. Class open to business and economics majors. 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 business and economics majors. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences, and textiles, clothing and interiors majors. Class not open to freshmen. BUS 4620 COMPUTER NETWORKS (5) Registration Approval: SBE Coordinator. Prerequisite: BUS 3620. The components, development and management of computer networks are studied. Topics include telecommunications, installation and configuration of computer systems, network operations and management, client/server network issues, distributed systems, business applications of networks, hands-on network installation. Attribute: Upper Division. Class open to business and economics majors. Class open to accounting, business administration, computer science, economics, family and consumer sciences, food and nutritional sciences, and textiles, clothing and interiors majors. Class not open to freshmen and sophomores. BUS 4622 INFORMATION AND DATABASE SYSTEMS (5) Registration Approval: SBE Coordinator. Prerequisites: BUS 3620 and CSC 1130 or CSC 1230. Database concepts and management issues are explored from information modeling to the implementation and application of a database. Topics include information modeling, database design and manipulation, query languages, integrity, reliability, distributed database, database management, design and implementation of a database application. Attribute: Upper Division. Class not open to freshmen. BUS 4625 THE ORGANIZATION’S PRESENCE ON THE NET (5) Registration Approval: SBE Coordinator. Prerequisites: BUS 3620, 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 organizations 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 level. Class not open to freshmen and sophomores. BUS 4644 OPERATIONS MANAGEMENT (5) Registration Approval: SBE Coordinator. Prerequisite: BUS 3700. 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 business and economics majors. 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.
Requirements for the Major
(70 credits)
(Refer to page 64 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)
POLL 1110 Introduction to Politics (5)
POLL 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
BUS 3400 Business Ethics ....................................................................... 5
ECN 4316 Issues in Political Economy ...................................................... 5

Economics electives (15 credits required)
Take at least two courses from the following list; students then may (with approval of advisor) select ECN 4900 or a course in finance or business to complete the 15 credits:
ECN 2207 Economic Geography ............................................................... 5
ECN 3231 Urban Economics .................................................................. 5
ECN 3318 Economics of the Public Sector (5) ........................................... 5
ECN 3321 Money and Banking (5)
ECN 3635 Marxism: 20th Century Theory and Practice (3)
ECN 3640 Growth of the American System (3)
ECN 4641-4684 History of Economic Thought (3)
GEO 3500 Geography of Natural Resources (5) ..................................... 15
Total ........................................................................................................... 70

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, MAT1228 Series and Differential Equations, and BUS 3710 Optimization and Statistics. Students completing these four courses may count these as 5 credits of electives in the economics major, and they may waive the requirement for GEO1110, POL1110 or POL1120.

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

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

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

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

ECN 3101 INTERMEDIATE MACROECONOMICS (5) Registration Approval: SBE Coordinator. Prerequisites: ECN 2101, 2102. An analysis of aggregate income, employment and price level, classical and Keynesian perspectives, and recent contributions. Attributes: Upper Division and Writing Course. Class not open to freshmen.

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

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

ECN 3318 ECONOMICS OF THE PUBLIC SECTOR (5) Registration Approval: SBE Coordinator. 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 ECONOMY (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 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 4642 HISTORY OF ECONOMIC THOUGHT II (1-3) Registration Approval: SBE Coordinator. Prerequisites: ECN 2101, 2102 and 4641. Continuation of ECN 4641. Attribute: Upper Division. Class not open to freshmen.

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

ECN 4940 INTERNSHIP IN ECONOMICS (1-5) Registration Approval: Intern Learning Contract Req. Provides field experience opportunities for students to relate and apply principles of business, faith, service and leadership to a professional business setting. Course consists of an internship in a professional business setting (minimum 10 hours/week) and an on-campus seminar. Internship placement must be arranged the quarter prior to registration. Additional information may be obtained from the Career Development Center or internship coordinator for the School of Business and Economics. May be repeated for credit up to 10 credits. Course Equivalent: BUS 4940. Attribute: Upper Division. Class not open to freshmen and sophomores.

Executive Advisory Council

The purpose of the 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 GARRET IVES & OLIVER, PLLC
Luther J. Carr Jr., President, ENVIRONMENTAL HOUSING GROUP
Tom Coccione, Executive Vice President of Sales and Marketing, CONVERSAY
Robert L. Dryden, President and CEO, CONNEXT, EAC Emeritus
F. Kemper Freeman, President, BELLEVUE SQUARE MANAGERS, INC.
Scott Griffin, Vice President and CIO, THE BOEING CO.
Michael R. Hallman, Owner, THE HALLMAN GROUP
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
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, ECONOMIC AND TRADE DEVELOPMENT DEPT., PORT OF SEATTLE
Nancy Buffetton Lucks, Director, CENTER FOR APPLIED LEARNING, SCHOOL OF BUSINESS AND ECONOMICS, EAC Emeritus
D. Douglas McKenna, Psychologist
Jack McMillan, Director-Retired, NORDSTROM, EAC Emeritus
Gordon A. Nygard, Executive Director and Treasurer, SEATTLE PACIFIC FOUNDATION
Richard E. Paetzke, President, DICK PAETZKE CREATIVE DIRECTIONS
David Justin Ross, CEO, President and Founder, RAF TECHNOLOGY
Barry Rowan, Former CFO, VELOCOM INC., EAC Emeritus
Paul Song, President and CEO, NOETIX CORPORATION
Donald B. Summers, President, THE MERIDIAN CONSULTING GROUP INC.
George E. Toles Jr., Owner, THE TOLES GROUP
Bruce A. Walker, Chairman, VALCO GRAPHICS, INC.
Frederic S. Weiss, President, WEISS-JENKINS DEVELOPMENT COMPANY
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 1984.


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

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

Kenneth E. Knight, Professor of Management and Information Systems; B.S., Yale University, 1959; M.S., Carnegie-Mellon University, 1961; Ph.D., 1964. At SPU since 1989.

Joanna K. Poznanska, Professor of International Business and Economics; M.A., University of Warsaw, 1970; Ph.D., Technical University of Warsaw, 1976; postgraduate studies at Cornell University; Researcher, Woodrow Wilson School of Public and International Affairs, Princeton University, 1980-81. At SPU since 1988.

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

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


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

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

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

Chemistry and Biochemistry

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

Lyle Peter, Chair; Grayson Capp, Greg Phelan, Charlotte Pratt, Daisy Zhang

Chemistry is primarily concerned with matter, energy and their interactions. Chemists do a wide variety of things, including the following: They make new substances, including new materials and medicines; design new ways to make known compounds, isolating and determining chemical structures of naturally occurring substances; elucidate the chemical bases of biological processes, explaining the changes matter undergoes, developing and applying analytical techniques for criminal investigations and environmental problems; sell chemicals, teach chemistry and apply chemical knowledge to solve other societal and technological problems.

Chemists are concerned about the effect their work and technology have on society and on individuals. They are in the forefront of efforts to make sure that technology serves humankind rather than vice versa. The curriculum is designed to serve persons desiring to enter a career in chemistry, biochemistry or science education, as well as those interested in pursuing further study in medicine, dentistry, pharmacy, engineering and the other sciences. To qualify for admission to the major, a student must have a 2.5 minimum GPA.

Requirements for the Chemistry Major
(Refer to page 64 for a summary of degree requirements.)

Core Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHM 2371</td>
<td>2372, 2373 Organic Chemistry</td>
</tr>
<tr>
<td>CHM 3225</td>
<td>3226 Analytical Chemistry</td>
</tr>
<tr>
<td>CHM 3540</td>
<td>Inorganic Chemistry</td>
</tr>
<tr>
<td>PHY 1121</td>
<td>1122, 1123 Physics for Science and Engineering</td>
</tr>
</tbody>
</table>

Total .................................................................................. 45

The majority of students will also need to take CHM 1211 as a prerequisite to CHM 2371.
Chemistry Seminars
Chemistry majors are required to attend the chemistry seminars during their junior and senior years. These seminars will be scheduled up to five times per quarter to provide a forum for undergraduate research students, faculty and visiting chemists to communicate the results of their research.

B.S. in Chemistry
(65 credits in chemistry; 45 upper division in chemistry)
This course of study is recommended for a professional degree in chemistry or for those interested in doing graduate and other advanced work in chemistry, certain aspects of molecular biology, toxicology and forensic science. It conforms with the recommendations of the American Chemical Society and should prepare the student for graduate work in chemistry or for employment as a chemist. A minimum of 65 credits in chemistry (excluding CHM 1100, 1110, 1330 and 3400) is required, including the core requirements listed above, and CHM 3226, 3401, 3402, 3403 (12 credits); CHM 3460 (3 credits); CHM 4542 (3 credits); 5 credits of Independent Project (CHM 4900), or Internship (CHM 4940) plus chemistry electives. The physics requirement and chemistry seminar requirement are described above. Also, MAT 1225, 1226 and 1228 are required. Additional mathematics (such as MAT 2228, 2375 and 2401) is recommended for students planning to go on to graduate work in certain areas of chemistry. A computer programming course is strongly recommended. A reading knowledge of German, French or Russian is desirable for those who plan to do graduate work in chemistry. The B.S. chemistry track is credit intensive. In order to complete the major in four years, a student ideally should begin with CHM 1211 or 2371 and MAT 1225 in the first quarter of his or her freshman year. A suggested curriculum is listed below, but it is important that the student meet with a chemistry advisor early to plan the specific details, especially if considering a pre-professional track.

Suggested First Year B.S. Chemistry Curriculum

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHM 1211 General Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>MAT 1225 Calculus</td>
<td>5</td>
</tr>
<tr>
<td>General Education</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

Winter

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHM 2371 Organic Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>MAT 1226 Calculus</td>
<td>5</td>
</tr>
<tr>
<td>General Education</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHM 2372 Organic Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>MAT 1228 Series and Differential Equation</td>
<td>5</td>
</tr>
<tr>
<td>General Education</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

Suggested Second Year B.S. Chemistry Curriculum

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHM 2373 Organic Chemistry</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5</strong></td>
</tr>
</tbody>
</table>

Suggested Third Year B.S. Chemistry Curriculum should include CHM 3401, 3402, 3403, 3460, general education courses, and other science and general elective courses. A chemistry advisor should be consulted to tailor the schedule to the students needs.

B.S. in Biochemistry
(63 credits in biology and chemistry; 43 upper division)
The molecular aspects of the life sciences call for an interdisciplinary course of study in chemistry and biology, plus background support in physics and mathematics. This degree prepares students for graduate study in biochemistry and molecular biology. It provides a strong background for entrance to medical school, dental school and the field of biotechnology. The program includes 48 credits of chemistry; 15 credits of biology; 15 credits of physics (PHY 1101, 1102 and 1103, or 1121, 1122 and 1123); 15 credits of calculus (MAT 1225, 1226, 1228). Chemistry courses should include CHM 2371, 2372, 2373, 3226, either 3400 or 3401, 3402 or 3403, 4361, 4362, 4363. Biology courses should include BIO 2101, 3325 and 4325. In addition students should take 5 credits of research, CHM 4960, in their junior and/or senior years. Ten to 20 credits of electives can be selected from the following; BIO 2102 or 2103, BIO 4352, CHM 3226, CHM 3460, CHM 3540, CHM 4374, CHM 4542. For those interested in pursuing a research career in, and/or a graduate degree in, biochemistry, it is strongly recommended that the student complete at least one year of calculus and at least two of the three physical chemistry courses, CHM 3401, 3402, 3403 and their prerequisites.

Suggested First Year B.S. Biochemistry Curriculum

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHM 1211 General Chemistry</td>
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</tr>
<tr>
<td>MAT 1225 Calculus</td>
<td>5</td>
</tr>
<tr>
<td>General Education</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

Winter

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHM 2371 Organic Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>MAT 1226 Calculus</td>
<td>5</td>
</tr>
<tr>
<td>General Education</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHM 2372 Organic Chemistry</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5</strong></td>
</tr>
</tbody>
</table>
MAT 1228 Calculus ................................................. 5
General Education .................................................. 5

15

Suggested Second Year B.S. Biochemistry Curriculum

Autumn
CHM 2373 Organic Chemistry .................................. 5
PHY 1121 or 1101 General Physics ............................ 5
BIO 2101 General Biology ........................................ 5

Winter
CHM 3225 Chemical Equilibrium and Analysis .......... 5
PHY 1122 or 1102 General Physics ............................ 5
General Education .................................................. 5

Spring
CHM 3540 or CHM 3400 Physical Chemistry for the Life Sciences ........................................ 5
PHY 1123 or 1103 General Physics ............................ 5
General Education .................................................. 5

Ideally, the third year B.S. biochemistry curriculum should include the CHM 4361, 4362, 4363 sequence, BIO 3325 and BIO 4325, along with general education and electives. A chemistry/biochemistry advisor should be consulted to tailor the schedule to the student’s goals.

B.A. in Chemistry

(50 credits in chemistry; 30 upper division in chemistry)
This option is suited for students preparing for medical or dental school, careers in medical technology, pharmacy or related fields, or to teach chemistry at the secondary level. A minimum of 50 credits in chemistry (excluding CHM 1100, 1110 and 1330) are required, including the core requirements listed above, and CHM 3400 or 3401 and 3460, plus chemistry electives. Those interested in careers in medicine, dentistry or other health related field, should choose CHM 4361 and 4362 as electives. The physics requirement and chemistry seminar requirement are described above. Also required is MAT 1225 and 1226, although generally MAT 1228 should be also taken.

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.

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 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

Students interested in medicine, dentistry or similar professional health career should complete B.S. in biochemistry, or a B.S. or B.A. in chemistry including biochemistry courses. See Pre-Professional Health section of the Catalog.

Medical Technology

Medical technology students should complete a B.A. or B.S in chemistry with biochemistry, or the B.S. in biochemistry. See Pre-Professional Health section of the Catalog.

Chemistry Courses

CHM 1100 INTRODUCTION TO CHEMISTRY (5) Prerequisites: 1 1/2 years of high school mathematics including algebra, or permission of instructor; passing score on the SPU Mathematics Proficiency Exam or take the required MAT 0120 credits concurrently. 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, 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, atomic and molecular structure. 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, gas laws, functional groups and reaction mechanisms as applied to organic chemistry. Laboratory work will emphasize basic methods of separation and purification representative substances.

CHM 2372 ORGANIC CHEMISTRY (5) Prerequisite: CHM 2371. A continuation of CHM 2371. Continues studies of principles of nomenclature, synthesis, thermodynamics, structure and reaction mechanisms to a broadening collection of organic functional groups. Introduces spectroscopic methods. Laboratory work will emphasize basic methods of synthesis of representative compounds, and obtaining their spectra and other properties.
CHM 2373 ORGANIC CHEMISTRY (5) Prerequisite: CHM 2372. A continuation of CHM 2372. Completes a survey of the properties of common organic functional groups and introduces topics of bioorganic chemistry. Laboratory includes some qualitative organic analysis, identifying unknown substances using chemical, physical and instrumental techniques.

CHM 2530 CHEMISTRY PRACTICUM (1-3) Registration Approval: Instructor. Selected students are assigned teaching, grading, laboratory preparation and/or tutoring responsibilities. May be repeated for credit up to 3 credits.

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

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

CHM 3400 PHYSICAL CHEMISTRY FOR LIFE SCIENCES (5) Prerequisites: CHM 2373, him or her by contract. Attributes: Upper Division. Laboratory studies chemical properties of biological compounds: carbohydrates, lipids, amino acids and proteins and nucleic acids. May include computer applications. May be repeated for credit up to 3 credits.

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

CHM 3402 PHYSICAL CHEMISTRY (4) Prerequisite: CHM 3540, PHY 1103 or PHY 1123, and MAT 1228 or permission of instructor. Studies quantum theory and group theory and their applications to spectroscopy, molecular and solid-state structures and bonding. Attribute: Upper Division.

CHM 3403 PHYSICAL CHEMISTRY (4) Prerequisite: CHM 3225, PHY 1103 or PHY 1123, and MAT 1228 or permission of instructor. Studies statistical mechanics, chemical kinetics, physical and chemical equilibria, electrochemistry and selected related topics. Attribute: Upper Division.

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

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


CHM 4363 BIOCHEMISTRY (3) Prerequisite: CHM 3482 or permission of instructor. Explores selected topics including immunoglobulins and the immune system; bacterial cell walls; membrane transport; hormone action; control of gene expression; muscle contraction; cell physiology; drug action; protein folding; HIV mechanisms; 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, organic 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 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 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; also, the student must report orally on his or her results at a Chemistry Department seminar. May be repeated for credit up to 15 credits. Attributes: Upper Division and Writing Course.

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

CHM 4940 INTERNSHIP IN CHEMISTRY/BIOCHEMISTRY (1-5) Registration Approval: Intern Learning Contract Req. Provides a significant learning experience through a closely supervised work-study program. A final written report is required; also, 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

Grayson L. Capp, Professor of Chemistry; B.S., Seattle Pacific College, 1958; M.S., University of Oregon, 1961; Ph.D., 1966; National Institute of Health Post-Doctoral Fellow, Duke University, 1966-68; At SPU since 1968.
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.


Charlotte Pratt, Assistant Professor of Biochemistry; B.S., (biology), University of Notre Dame, 1982; Ph.D., (biochemistry) Duke University, 1987. At SPU since 2001.

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

Debra Sequeira, Chair, Richard Jackson, Journalism contact. Lorelle Jabs, William Purcell, Todd Rendleman
The Department of Communication and Journalism investigates communication as a social and intellectual process, views oral forms as shapers of history, examines speech as an art form and a tool, and studies journalism as responsible human behavior. Courses are offered to all students seeking understanding, ethical frameworks and skills to manage their conduct as communicators, in mediated and unmediated forms. Those who major in communication explore theory, history and application of human communication from ancient times to the present. Those who specialize in communication or journalism as majors or minors explore the impact of communication and communications on society, and develop ethical and theoretical understandings and skills for managing ideas and relationships.

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 page XX 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 ......................................................... 5
or COM 3629 Modern Rhetorical Theory ......................................................... 5
COM 4142 Advanced Interpersonal Communication ........................................ 5
COM 2227 Small Group Discussion ................................................................. 5
or COM 4625 Organizational Communication .................................................. 5
COM 4910 Communication Seminar .................................................................. 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 .................................................................. 4
JRN 2202 Public Affairs Reporting .................................................................. 4
JRN 2203 Editing and Design ........................................................................... 4
JRN 3301 Media Law ...................................................................................... 5
COM 4177 Communication Ethics .................................................................. 5
JRN 4910 Journalism Seminar ........................................................................ 5
Student Publications/Internships .................................................................. 4-6
Total .................................................................................. 56-62

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 News and Informational Writing ......................... 4
JRN 2202 Public Affairs Reporting .................................. 4
JRN 2203 Editing and Design ......................................... 4
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) .......... 6
Electives to complete 30 credit minimum ..................... 2
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 communication style and 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 1227 SMALL-GROUP DISCUSSION AND LEADERSHIP (5) Develops awareness of and experience in the processes of small, coacting group activity; examines and applies theories of communication to improve employee relationships and organizational effectiveness. Attribute: Upper Division.

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

COM 2227 SMALL-GROUP DISCUSSION AND LEADERSHIP (5) Develops awareness of and experience in the processes of small, coacting group activity; examines and applies theories of communication to improve employee relationships and organizational effectiveness. Attribute: Upper Division.

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 4810. Attributes: Upper Division and Writing Course.


COM 3231 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 and Upper Division. Class not open to freshmen.

COM 3930 FORENSICS 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 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 3932 ADVANCED INTERPERSONAL COMMUNICATION (5) Prerequisites: COM 3001 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 3977 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 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 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 4273 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 CRITICISM OF PUBLIC ADDRESS (5) Applies rhetorical theories to historical and contemporary political, social and religious oratory. Treats the speech as historical document, cause of social change and refiner of theory. COM 3628 or 3629 is strongly recommended before registration for COM 4607. Attributes: Upper Division and Writing Course.

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

COM 4910 COMMUNICATION SEMINAR (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.
COMM 4940 COOP EDUCATION: JOURNALISM INTERNSHIP (1-5) Registration Approval: Instructor. Provides opportunity for application of writing, editing and production skills in leadership roles in student publications. Open only to those officially selected for positions. No more than 6 credits of Publication Editor Practicum and Newspaper Production total may count toward the JRN track or minor. May be repeated for credit up to 6 credits. Attribute: Upper Division.

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

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

JRN 4910 JOURNALISM SEMINAR (4) Senior capstone course in the journalism track. Assignments include a final journalism portfolio and papers dealing with the relationship between Christian faith and journalism ethics. Attribute: Upper Division. Class open to communication majors. Class not open to freshmen and sophomores.

JRN 4920 DIRECTED READINGS (1-5) Registration Approval: Independent Study Agreement. Attribute: Upper Division.

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

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

Faculty

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


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


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, modem and printer. Software should include Windows 2000 or Windows XP; Microsoft Visual C/C++ Version 6 (or later) and a word processor (such as Microsoft Word). 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
(106 credits; 45 upper division)
(Refer to chart on page 108.)
(Refer to page 64 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 page 64 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
(85 credits; 37-42 upper division)
(Refer to chart on page 108.)
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
(83 credits; 40 upper division)
(Refer to chart on page 108.)
This option provides a thorough preparation in the topics and applications of computer science.

B.A. - Computer and Information Technology Option
(65 credits plus specialization; 32 upper division in core)
(Refer to chart on page 108.)
This option combines preparation in the core areas of computer science with an approved CIT specialization. See computer science advisor for details.

Computer Science Evening Track
Evening and late afternoon scheduling of computer science courses provides flexibility in completion of a computer science or professional studies degree. Contact the computer science evening major coordinator at (206) 281-2140 for information regarding scheduling for the coming year.
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 1120 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 1380 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 (Window-based) computer. Description of computer hardware components; basics of the windowing environment, including the file system, running applications, editing messages and documents, and printing; also 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; printing notes and handouts.

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

CSC 1230 PROBLEM SOLVING AND PROGRAMMING (5) Prerequisites: High school pre-calculus, math analysis or equivalent, demonstrable computer literacy. Introduction to computer science. 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 3 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 2224 OBJECT ORIENTED PROGRAMMING (3) Prerequisite: CSC 2430. Introduces the object-oriented programming methodology, languages and systems. Examines encapsulation, classes, inheritance and polymorphism.

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. Linked data structures, including trees and other non-linear representations. Introduction to graphs and networks. Explores external data structures and techniques necessary for implementing different file organizations. Covers 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 credit up to 99 credits. Class open to freshmen and sophomores.

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 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; and architecture, user-interface and program design. Measures for the evaluation of specifications and designs. Attributes: Upper Division and Writing Course.

CSC 3310 CONCEPTS IN PROGRAMMING LANGUAGES (4) Prerequisite: CSC 2431 and (CSC 2220 or CSC 2221 or CSC 2224). Explores organization and structure of programming languages; run-time behavior and requirements of programs; and programming language specification. Attribute: Upper Division.

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

CSC 3360 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 3370 COMPUTER ARCHITECTURE AND ORGANIZATION (5) Prerequisites: CSC 2431 (concurrent registration allowed), and MAT 1720 or 2720. Digital logic, computer structure, machine language, addressing, use and operation of assemblers, micro-architectures, instruction formats and the memory hierarchy. Attribute: Upper Division.
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<tr>
<th>Required Courses</th>
<th>B.S.</th>
<th>B.A. Systems</th>
<th>B.A. Business</th>
<th>B.A. Comp and Info Tech</th>
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<td>CSC 1230 Problem Solving and Programming</td>
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<td>CSC 2221 Programming Techniques</td>
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<td>CSC 2220 Scientific Programming or CSC 2221 Programming Techniques or CSC 2224 Object Oriented Programming</td>
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<td>CSC 2430 Data Structures I</td>
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<td>CSC 2431 Data Structures II</td>
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<td>CSC 3150 Systems Design</td>
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<td>CSC 3310 Concepts in Programming Languages</td>
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<td>CSC 3350 Systems Programming</td>
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<td>CSC 3430 Algorithm Design and Analysis</td>
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<td>CSC 3750 Computer Architecture</td>
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<td>CSC 3760 Computer Organization</td>
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<td>CSC 4990 Senior Capstone in CSC</td>
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<td>MAT 1720 Math for Computer Science</td>
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<td>MAT 1360 Introduction to Statistics</td>
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<td>MAT 1221 Survey of Calculus or MAT 1225 Calculus</td>
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<td>MAT 1226 Calculus</td>
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<td>MAT 2375 Probability Theory</td>
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<td>MAT 2376 Applied Statistics</td>
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<td>MAT 2720 Discrete Mathematics</td>
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<td>EE 1210 Logic System Design</td>
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<td>EE 3280 Microcontroller System Design</td>
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<td>ACCT 2362 Managerial Accounting or BUS 3250 Business Finance</td>
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<td>Computer and Information Technology Specialization</td>
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<td>37-42</td>
<td>32+ specialization</td>
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<td>Total Credits Required</td>
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<td>83</td>
<td>85</td>
<td>65 + specialization</td>
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**CSC 3760 COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE (5)** Prerequisites: CSC 2430 and EE 1210. CSC 2431 is recommended. 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 EE 3760. Attribute: Upper Division.

**CSC 3900 INDEPENDENT STUDY IN COMPUTER SCIENCE (1-5)** Registration Approval: Independent Study Agreement. Includes academic and research in an advanced computer science topic. May be repeated for credit up to 10 credits. Attribute: Upper Division.

**CSC 3930 PRACTICUM IN COMPUTER SCIENCE (1-5)** Registration Approval: Instructor. Studies applied computer science.
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 2431 and 3150. Covers topics in software engineering, including team programming, project planning and management, SDLC (software development lifecycle) and software quality assurance. 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.

CSC 4210 THEORY OF COMPUTATION AND ALGORITHM (4) Prerequisites: CSC 3490 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 4310 COMPILER DESIGN (4) Prerequisites: CSC 3310 and 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 2431 and 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 placed on principles of parallelism and their application. State-of-the-art super computers are 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 4810 ADVANCED ISSUES IN COMPUTER SCIENCE (4) An advanced course studying a special interest topic in computer science. Topics and credits may vary between offerings. Computer science minors may take this course with instructor approval. May be repeated for an unlimited number of credits. Attributes: Upper Division and Writing Course. Class open to computer science majors.

CSC 4899 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. Computer science minors may take this course with instructor approval. Attributes: Upper Division and Writing Course. Class open to computer science majors. Class not open to freshmen and sophomores.

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

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

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

CSC 4960 PROJECT IN COMPUTER SCIENCE (1-5) Registration Approval: Instructor. Independent work on a significant project in computer science. May be repeated for credit up to 8 credits. Attribute: Upper Division.

CSC 4990 SENIOR CAPSTONE IN COMPUTER SCIENCE (2) This senior capstone course will explore topics and frontiers in computer science. Students will write a significant paper or design and implement an experimental project that investigates a current topic within the computer science discipline. Attribute: Upper Division. Class open to computer science majors. Class open to seniors.

Faculty

Charles H. Burris Jr., Associate Professor of Computer Science; B.S., University of Utah, 1985; M.S., 1987; 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 Computer Science; 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.
The mission of the Seattle Pacific University School of Education is 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 Seattle Pacific University School of Education is 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 residential requirements for state of Washington 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 five professional quarters of the basic programs are built on this knowledge base and reflect recent research on effective teaching. The following categories shape the competency base for the residency certification programs at SPU. These categories contain national, state and Seattle Pacific criteria for teacher competencies:

**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.

The School of Education also offers the following graduate programs: a doctorate of education; an education specialist degree in school psychology; and master’s degrees in educational leadership, school counseling, and curriculum and instruction. Curriculum and instruction specializations are available in the areas of teaching and learning, reading/language arts and instructional technology. A master of arts in teaching with a secondary emphasis is also offered. For more information on SPU’s graduate education programs, contact the School of Education directly at (206) 281-2214.

**Advising**

Students must have competent academic advice in order to complete the residential certificate program in a timely manner. To assure the provision of such advice, the School of Education provides group and individual sessions with the certification coordinator. 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. Out of that advising session, a tentative advising schedule can be formed. In order to follow the advising schedule, all prerequisites must be completed before class limits are reached.

**Transfer Students**

1. All transfer students must meet the requirements for admission to the School of Education. (A cumulative grade point average of 3.0, including work taken at SPU and other institutions or 3.3 in the last 45 credits of college or university work is required.)

2. Transfer students who desire to transfer courses required for certification should confer with the certification coordinator regarding course substitution requirements and procedures before they begin the program.

3. All transfer students must complete at least 14 credits, including professional courses, at SPU before being considered for admission to the School of Education.

4. All students must have an acceptable undergraduate major according to state program certification guidelines.

5. All transfer students are required to take the entire certification program at SPU. Any exceptions must be approved through the regular substitution or petition process of the School of Education. If any petitions are granted, a minimum of 26 credits must be completed as a regularly enrolled student at SPU, including the internship.
School of Education Code of Ethics

As teachers perform their duties, they serve as role models exhibiting standards of behavior that are not only observed by the students they serve, but also often observed by colleagues, parents and members of the community. As visible models, teachers must be able to demonstrate a high standard of ethical behavior. In the School of Education, teachers are prepared for their place as members of the teaching profession, and as people who will live their lives through Christian principles, which gives additional meaning to the development of moral character. As students and emerging teachers, individuals will be honest and fair, and will treat others with respect and trust. The following specific behaviors apply as related to the individual’s academic conduct and as an emerging teacher who will be teaching and reinforcing these behaviors in students:

- **Academic Work.** (1) The individual’s academic work (such as papers, assignments, reports and tests) submitted shall be the student’s own work or appropriately attributed in part or in whole to its correct source. (2) The individual will use only his or her own information and only authorized notes or study aids on an examination (i.e., it is unacceptable to use information from another student or another student’s paper during an examination unless directed by the instructor to work with another student or in cooperative groups). (3) The individual will not alter a graded paper and submit it for re-grading unless asked to do so by the instructor. The individual will submit work that is only his or her own. This means that submission of commercially prepared materials as if they are one’s own is unacceptable.

- **Research Procedures.** Data in a piece of work must be gathered in accordance with guidelines defining the appropriate methods for collecting and generating data and must be accompanied by an accurate account of the method by which data were gathered or collected.

- **Aiding Honesty in Others.** The individual will encourage honesty in others by refraining from providing materials or information to another person with knowledge that these materials or information will be used improperly.

- **Authenticity of Documents.** The individual will present only authentic documents and records such as transcripts, grade reports, letters of permission or recommendation, petitions or any document designed to meet or exempt the individual from an established requirement or regulation.

Students who break this code of ethics will be subject to disciplinary action that could include expulsion from the program. The course instructor and program administrator will determine the type and degree of disciplinary action. Their decision can be appealed to the dean.

Moral Character and Personal Fitness Policy

Teacher certification programs at SPU include a number of experiences working closely with children in public and private schools. This confirms the belief that this is an important opportunity for potential teachers to learn and to develop the skills necessary for successful teaching. It is the responsibility of the School of Education to provide prospective teachers with meaningful experiences in school settings. At the same time, the School of Education seeks to insure that the individuals who we send into the classrooms to work with children in the classroom are adequately prepared academically, and that they possess the desirable psychological and emotional characteristics for working with children.

The protection of children from inadequately trained individuals or from individuals of questionable moral, emotional or psychological stability is a paramount concern. Consequently, the School of Education reserves the right to refuse placement of any SPU student in a practicum setting (including Professional Quarter 2) if, in the professional judgment of School of Education faculty, there is a cause for concern about the fitness of that individual to work closely with children. 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 in a setting with children.
3. Information received about the fitness of the student for 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 the 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.

Residential Certification Program

Frank Kline, Assistant Dean for Teacher Education

The School of Education will recommend a candidate for the residential certificate in the state of Washington when he or she has acquired the following:
The professional program in education at SPU consists of several parts, including:

1. **The Foundations Unit**. Professional Quarters 1 and 2 provide an overview of theory, pedagogy and educational issues along with some limited field experience.

2. **The Methods and Skills Courses**. Provide content breadth and depth.

3. **The Applications Unit**. Professional Quarters 3, 4 and 5 provide in-depth training in methods courses along with field experiences that culminate in a full-time internship.

### Prerequisites to Professional Quarter 1*

1. Grade point average (GPA) must be 2.8 cumulative or 3.00 in the last 30 credit hours, including 3.00 in one quarter of at least a 12-credit load.
2. Moral Character/Personal Fitness and Code of Ethics forms, as well as the state character and fitness supplement must be completed and filed in the School of Education Office.
3. Complete at least 45 credit hours (sophomore standing).

*Verification of completion of prerequisites must be done prior to registering and prior to the first day of Professional Quarter 1 classes.

### Professional Quarter 2

This quarter is designed to provide the basic foundations for beginning teaching. It introduces the student to the area of educational psychology and the social ramifications of the schooling process. Students are placed in daily public school laboratory experiences that provide them an opportunity to immediately observe and apply their learning. This involves one-fourth of the school day; then they return to campus for classes and conferences related to the laboratory assignments. Students also continue the development of their professional portfolio. Laboratory students are expected to provide their own transportation to and from the school settings. Students are continually evaluated on cognitive, effective and professional qualities in addition to coursework throughout the program. At this point, there is a formal evaluation of these elements completed by faculty. Successful completion of the Foundations Unit with a favorable evaluation is required for admission to the School of Education.

EDU 3102 Applications of Educational Psychology .......... 2
EDU 3104 Foundations of Multicultural Education .......... 2
EDSP 3107 Exceptionality in the Classroom ............... 2-3
EDU 3105 Laboratory Experience ................................ 3

### Prerequisites to Professional Quarter 2*

1. Satisfactory completion of Professional Quarter 1.
2. Maintenance of the GPA required for entrance to Professional Quarter 1.
3. Successful completion of the English, spelling and math competency tests. (SAT or ACT test scores, as outlined under Proficiency Testing Program elsewhere in this Catalog will meet the math competency for School of Education purposes, but not the English competency.) All education certification students must take the English test. (Check with the School of Education for specific requirements and alternatives if score is low.)
4. Successful completion of PSY 1180 General Psychology (not more than five years before Professional Quarter 2) with a grade of “C” (2.0) or better. Another developmental psychology course may be substituted with permission from the certification coordinator.

*Verification of completion of prerequisites must be done prior to registering and prior to the first day of Professional Quarter 2 classes.

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### Foundations Unit: Professional Quarters 1 and 2, Elementary and Secondary

Sharon Hartnett, Chair

**Professional Quarter 1**

This quarter presents an overview of instructional technologies, historical and philosophical foundations of education, and current educational issues and trends. Students explore practical and professional aspects of teaching through service learning, class presentations and by beginning the development of a professional portfolio.

EDU 2103 Foundations of Education, Instruction and Classroom Management ........................................ 3
EDTC 2235 Introduction to Educational Technology ........ 2
Admission to the School of Education

A student enrolling in Professional Quarter 1 is considered a tentative candidate for admission to the School of Education. During Professional Quarter 2, the student is asked to prepare a formal application for full admission to the School of Education, which may be considered only upon satisfactory completion of Professional Quarter 2. Upon formal admission to the School of Education and completion of the appropriate prerequisites, the student may continue the sequence of applications courses (Professional Quarters 3, 4 and 5).

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

1. Complete the foundations unit (Professional Quarters 1 and 2) and achieve a favorable recommendation from the foundations team (the foundations experience must be no more than five years old) for admission to Professional Quarters 4 and 5.

2. Achieve a “B” average (3.0) in EDU 2102, 3103, 3104, EDSP 3107 (with no grade lower than “C”) and 3.0 or above in EDU 3105 (A = 4.0).

3. Achieve a cumulative GPA of at least 3.0 or have achieved a 3.3 GPA in the last 45 credits of college or university work.

4. Achieve a specified competency level in basic skills tests as determined by the School of Education. (Check with the School of Education for tests required, testing policy and specific competency level requirements.)

5. File appropriate Moral Character/Personal Fitness and Code of Ethics forms.

6. Complete and submit the application form to the School of Education.

7. Successfully plan and evaluate professional goals as required by the School of Education.

8. File a formal application for internship indicating projected quarters of internship (Professional Quarters 4 and 5).

Deadline for admission to the School of Education are as follows:

- For autumn/winter internship - April 1
- For winter/spring internship - September 1
- For spring/autumn internship - January 15

Methods and Skills Courses - Elementary

The student preparing for elementary teaching will complete, in addition to the academic major, elementary content and skills courses. These courses provide breadth in several academic areas including reading, mathematics, language arts, social science, physical education, health, science, and fine and applied arts. Students must earn a grade in the “C” range or better in each of the methods and skills courses to be recommended for certification.

Students should plan to use the courses to satisfy general education requirements in order to avoid the necessity of taking an excess of credits to satisfy graduation requirements. It is recommended that as many as possible of the methods and skills courses be completed prior to internship. History of the Pacific Northwest is required by some school districts for teachers who teach history of the Pacific Northwest in the intermediate grades, junior high and high school; it is not required by the state of Washington for certification. Required courses in these areas are as follows:

- ART 3546 Art Education ................................................ 3
- EDRD 4516 Children’s Literature .................................. 3
- PE 3510 Elementary Health and PE ............................ 4
- MUS 3500 (a prerequisite for MUS 3501 and MUS 3502) ....... 2
- MUS 3501 Elementary Methods and Materials (3) or MUS 3502 Music in Special Education ......................... 3
- Any college science course (3-5) .................. 3-5
- TLIN 2100 Foundations of Language Study ................. 3
- *MAT 2530 Survey of Mathematics I ...................... 3
- *MAT 2531 Survey of Mathematics II ..................... 2
- EDRD 3529 Child Language Development and the Reading Process ........................................ 3

Total ............................................................... 29-31

*Must be taken prior to Professional Quarter 3.
†Must be taken prior to Professional Quarter 4.
(See course listings under appropriate school or department for a course description and any additional prerequisites.)

Elementary Applications Unit: Professional Quarters 3, 4 and 5

Susan Franklin and Frank Kline, Co-chairs

These quarters involve both methods courses and a two- or three-quarter internship in state-approved school classrooms under the direction of both University and school supervisors. The purpose of the internship is to provide an extended experience in a teaching situation in which the student has opportunity to apply learning theory through active participation. These quarters should be taken during the senior year or as a post-baccalaureate student. The internship consists of observation and teaching duties in a public or an approved private school for two or three quarters, along with work in methods classes conducted by School of Education faculty. The intern not only works under, and is responsible to, the cooperating teacher and the principal of the assigned school, but the intern is also responsible to a Seattle Pacific University coordinator who gives professional guidance and evaluation. A grade of 3.0 or above in the internship is a prerequisite to recommendation for a teaching certificate.

Admission to Elementary Applications Unit: Professional Quarters 3, 4 and 5

To achieve admission to the Elementary Applications Unit for SPU the student must do the following:

1. Be admitted to the School of Education and maintain eligibility and good standing in the School of Education. If the foundations coursework is more than five years old, there will be an additional requirement to update that experience.
2. Maintain a 3.0 average following Professional Quarter 2.
3. Achieve senior or post-baccalaureate standing.
4. Complete MAT 2530, MAT 2531 (before Professional Quarter 3) and LIN 2100 and EDRD 3529 (before Professional Quarter 4).
5. Complete at least 15 upper-division credits in an approved major.
6. Participate in a placement interview with a designated member of the elementary team.
7. Receive fingerprint clearance. (Complete the filing process by the beginning of Professional Quarter 3 and be cleared by the beginning of Professional Quarter 4.)

The schedule of courses for the Applications Unit is as follows:
EDU 3942 September Experience ....................................... 1
(To be completed during the first September after Professional Quarter 2.)

Professional Quarter 3
(Must be taken concurrently.)
EDSC 4234 Science Methods: Elementary Emphasis .... 3
EDMA 4232 Mathematics Methods:
Elementary Emphasis ......................................................  3
EDU 3542 Field Experience: Elementary
Math and Science ............................................................ 2

Internship Placement and Supervision Policy
Students anticipating teaching internships should be aware of School of Education school-site placement policy.
1. Internship sites will be selected from districts near 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 three weeks prior to the first quarter of the scheduled internship. Failing to do so will result in a penalty of $70.
2. It is strongly recommended that students not be employed during Professional Quarters 4 and 5 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 4 and 5.
3. Interns are expected to provide their own transportation to the internship school sites.

Professional Quarter 4
(Must be taken concurrently.)
EDU 4230 Elementary General Methods ......................... 2
EDRD 4231 Reading, Language Arts Methods ............... 3
EDU 4233 Social Studies Methods:
Elementary Emphasis ...................................................... 3
EDU 4941 Internship A ........................................................ 9

Professional Quarter 5
(Must be taken concurrently.)
EDU 4942 Internship B ...................................................... 15
EDU 4800 Teacher As Person ............................................ .2
Methods and Skills Courses - Secondary
EDU 4530 Reading and Writing
Across the Curriculum .................................................... 2

Major Subject Methods Courses
The student chooses the appropriate methods course(s) from the following according to the major or primary endorsement area. It is suggested that the appropriate methods course also be taken for supporting endorsements. Methods courses will be accompanied by a 1-credit field experience to be taken concurrently unless the student is student teaching during their methods quarter. It is strongly suggested that the methods courses be taken as close to Professional Quarter 4 as possible.
Art: ART 3546 and 3547, Elementary and Secondary Art Methods (3 credits each)
*English: EDU 3361 Secondary English Methods (3)
Family Consumer Science: FCS 4511
Curriculum and Evaluation in FCS Edu. (3)
Foreign Languages: LIN 2100 Foundations of Language Study and LIN 4365 Methods of Foreign Language Education (3 credits each)
*Mathematics: EDMA 3357 Teaching Secondary Mathematics (3)
Music: MUS 3503 General Music Methods, MUS 3504 Choral Music Methods, and MUS 3505 Instrumental Music Methods (3 credits each)
Physical Education: PE 3510 and 3515 Elementary and Secondary Physical Education Methods (4 and 5 credits)
*Science: EDSC 3359 Teaching Secondary Science (3)
*Social Studies: EDU 4364 Teaching Secondary Social Studies (3)
*The prerequisite to these courses is successful completion of Professional Quarters 1 and 2.
Secondary Applications: Professional Quarters 3, 4 and 5

Ray Myers, Chair

Admission to Secondary Applications: Professional Quarters 3, 4 and 5

To achieve admission to the Secondary Applications Program the student must complete the following:

1. Be admitted to the School of Education and maintain eligibility and good standing in the School of Education. If the foundations coursework is more than five years old, there will be an additional requirement to update that experience.

2. Maintain a 3.0 average following Professional Quarter 2.

3. Achieve senior or post-baccalaureate standing.

4. Complete at least 15 upper-division credits in the major.

5. Get written recommendations from two SPU professors who teach in their major. These must be filed with the School of Education before registration for Professional Quarter 3 (form supplied by the School of Education).

6. Participate in a placement interview with a designated member of the elementary team.

7. Receive fingerprint clearance. (Complete the filing process by the beginning of Professional Quarter 3 and be cleared by the beginning of Professional Quarter 4.)

Note: Students will be contacted by secondary education at the appropriate time regarding item 6.

The schedule of courses for the Applications Unit is as follows: It is strongly recommended that Professional Quarter 3 be taken as close to Professional Quarters 4 and 5 as possible; Professional Quarters 4 and 5 must be taken in consecutive quarters.

EDU 3942 September Experience ............................. 1
(To be taken the first September after Professional Quarter 2.)

Professional Quarter 3
(Must be taken concurrently.)
EDU 4240 General Methods: Teaching Secondary .......... 3
EDU 4530 Topics in Secondary Education ..................... 2

Internship Placement and Supervision Policy

Students anticipating teaching internships should be aware of School of Education school-site placement policy.

1. Internship sites will be selected from districts near 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 three weeks prior to the first quarter of the scheduled internship. Failing to do so will result in a penalty of $70.

2. It is strongly recommended that students not be employed during Professional Quarters 4 and 5 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 4 and 5.

3. Interns are expected to provide their own transportation to the internship school sites.

Students are placed in a classroom setting for the entire two quarters, for a total of 17 credits each. Any student wishing to register for less than 17 credits per quarter must receive approval in writing from the chair of secondary education.

Professional Quarter 4
(Must be taken concurrently.)
EDU 4945 Secondary School Internship A .................. 16
EDU 4845 Secondary Student Teaching Seminar .......... 1

Professional Quarter 5
(Must be taken concurrently.)
EDU 4946 Secondary School Internship B .................. 15
EDU 4800 Teacher as Person ..................................... 2

Physical education, art, foreign language, music and special education majors seeking K-12 certification should check with the certification coordinator in the School of Education for specific requirements.

At the time students apply for admission to the School of Education they will indicate their preferred quarters for Professional Quarters 3, 4 and 5. While student preferences will be considered, class limits and quarters of course offerings will influence assignments.

Once a student has been assigned to a particular quarter to begin the application unit, Professional Quarters 3, 4 and 5, it is expected that the student will enter at that time. Requests for changes in the quarters will be handled on a space-available basis determined by class enrollment limits.
Majors

Majors for Elementary Teachers

An academic major is required for all elementary teachers in addition to the elementary certification requirements. Students may select their major from the majors stated under the Areas of Instruction section of the Catalog (e.g., English, family and consumer sciences, history, math, music, psychology, etc.). They also may select special education as their academic major or one of the broad field majors listed below. 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) ............................. 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 courses from the following to total .......... 4
  MUS 1250 Beginning Keyboard (2)
  or MUS 1251 Intermediate Keyboard (2)
  MUS 1260 Beginning Voice (2)
  or MUS 1261 Advanced Voice (2)
  MUS 1270 Beginning Folk Guitar (1)
  or 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 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 either 5 or 6: ................................................ 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
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)
  ENG 3248 New International Fiction (5)
  EUR 3287 Mythology in Literature (5) ......................... 10
Select two courses from the following:
  ENG 2201 Research for Writing (3)
  ENG 2215 Imaginative Writing (3)
  ENG 3301 Advanced Expository Writing (3)
  ENG 3318 Creative Nonfiction (3) .............................. 6
LIN 2100 Foundations of Language Study .................... 3
Select one of the following:
  TRE 1340 Acting I (5)
  TRE 1720 Stagecraft (5)
  TRE 3930 Performance Practicum (2)
  TRE 3931 Production Practicum (2)
  TRE 4770 Creative Dramatics (EDU 4540) (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.
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
MAT 2720 Discrete Mathematics ............................... 3
Select 3 or more credits of computer science courses ... 3
EDMA 4232 Mathematics Methods:
Elementary Emphasis ........................................... 3
MAT 4610W The Evolution of Mathematical Thought .... 3
MAT 4930 Practicum in Mathematics ......................... 1
MAT 4918W Senior Seminar .................................... 3
Electives (upper division) ........................................... 8
Total ............................................................................ 49
Approved electives to complete 49 credits: EDMA 3757, MAT 3401, MAT 3441, MAT 3443, MAT 3749, MAT 4402W, MAT 4910, MAT 4930; a maximum of 2 credits in MAT 4930 may be applied.

General Science
Ray Myers, Advisor, School of Education
(60 credits, 23 upper division)
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
Biology 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, 3311, 4242, 4243
Total ............................................................................ 60

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 (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 Microeconomics (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 SOC ............... 8-10
Total ............................................................................ 61-65
Note: Social science majors need to plan carefully so as to meet the University “W” requirement for graduation.

Majors for Secondary Teachers
Students wishing to prepare to teach at the secondary level should major in a content area from the list below. They should meet the requirements for bachelor’s degree candidates as listed under the various disciplines. In addition, they should establish a 3.0 cumulative GPA in all work in their major or complete at least 15 upper-division credits in the major with a grade of 3.0 or above in each course. Academic work below “C” (2.0) will apply toward total credit requirements for graduation but may not be applied toward the teaching major. The following are approved majors for secondary certification: biology, chemistry, English, family and consumer sciences, history, mathematics and physics. The following are approved majors for K-12 certification: art, French, German, music, physical education, Spanish and special education.

Secondary Supporting Endorsement
Students who plan to teach at the secondary level are strongly encouraged to prepare in a second teaching area. This may be a minor but must meet state endorsement requirements. If there are questions concerning the supporting endorsements, please see the certification coordinator in the School of Education.

Majors for K-12
Teaching Art Education: See the appropriate advisor in the Art Department.
Foreign languages: See the appropriate advisor for the specific language.
Music education: See the appropriate advisor in the Music Department.
Physical education: See the appropriate advisor in the Physical Education Department.

Special Education (K-12)
Annette Robinson, Chair
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. It is strongly recommended that the teacher candidate complete both the regular certification program (at either the elementary or secondary level), as well as the special education major. This would add an additional quarter of internship but will give the candidate experience in the regular classroom as well as the special education setting. For general requirements and admission policies, see the foundations and units in previous pages.

Admission to the Special Education Program

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 Advising Center 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 program requires completion of Professional Quarters 1 and 2 and with the School of Education Advising Center 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 program requires completion of Professional Quarters 1 and 2 and admission to the School of Education.

Requirements for the Special Education Major

(45 credits)

EDSP 3107 Exceptionality in the Classroom ................. 3
PSY 2470 Lifespan Developmental Psychology ........... 5
EDRD 3529 Child Language Development and the Reading Process ........................................ 3
EDSP 4642 Instructional Strategies for the Exceptional Student ........................................... 3
EDSP 4648 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 .......................................................... 3
EDSP 4657 Behavior Management: Applied Behavioral Analysis .............................................. 3
EDSP 4658 Senior Seminar: Issues in Special Education .......................................................... 3
EDSP 4943 Elementary Education Internship .......... 17
or EDSP 4948 Secondary Special Education Internship .................................................. 10

Total .......................................................... 45

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, 30 credits in a second academic area of emphasis and specialized certificate requirements.

2. For foundations requirements for a K-12 special education certificate, see the previous School of Education foundations units of this Catalog. Specific applications courses are required for the K-12 special education certificate. Applications include a required internship in special education. Students will have opportunities to gain competencies in curriculum planning with both elementary and secondary students.

3. Transfer students must complete a minimum of 15 upper-division credits in special education course work prior to the internship. In order for the School of Education to recommend a student for the K-12 special education certificate, the internship must be supervised directly by SPU School of Education faculty members.

Additional Courses Required for K-12 Special Education Only Certification

Elementary MAT 2530 Survey of Math I ....................... 3
MAT 2531 Survey of Math II ..................................... 2
EDRD 3529 Child Language Development and the Reading Process .................................. 3
EDTC 4235 Intro to Educational Technology .............. 2

Electives:

Minimum of two courses and 4-6 credits.
ART 3546 (3), EDSC 4234 (3), EDU 4233 (3), MUS 3500 (2), MUS 3502 (3), PE 3510 (4), PE 3515 (3).

Applications

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 Internship B ......................................................... 17

Secondary

EDU 4240 General Methods for Teaching in Secondary Schools ................................................. 5
EDRD 4530 Topics in Secondary Education .............. 2

Electives:

Minimum of two courses and 4-6 credits. EDMA 3357 (3), EDSC 3359 (3), EDU 3365 (3), EDU 4364 (3), EDU 3361 (3), FCS 4511 (3), Methods in Art, Music or Physical Education.

Applications

EDU 4948 Secondary Special Education Internship, two quarters, 17 credits each ...................... 34

Math Education

EDMA 3357 TEACHING SECONDARY MATHEMATICS (3)
Prerequisites: Admission to School of Education. Overviews content methods and strategies appropriate to the teaching of secondary school mathematics. Attention is given to the NCTM standards and Washington state essential learning requirements. Emphasis is also placed on problem solving. Recommended prior to or concurrent with first quarter internship. Corequisite: EDU 3537. 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 learning requirements. Corequisites:

Reading Education

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 4223, 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 and 2. Provides a functional approach to content-centered instruction that will prepare pre-service 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 3535. 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 the basic principles of science. Corequisites: EDU 3542. Attribute: 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 middle level science programs. Corequisite: 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 activity, 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 1. Examines the concept of difference, including influences of exceptionality on social and psychological roles. Presents strategies for inclusion of exceptional students 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 education 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 education 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 education alt. delivery and strategy and special education instructor methods. Class not open to freshmen and sophomores.

EDSP 4653 TEACHING READING TO EXCEPTIONAL STUDENTS (3) Registration Approval: School of Education. Prerequisites: EDRD 3529 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 4657 BEHAVIOR MANAGEMENT (3) Registration Approval: School of Education. Prerequisite: EDSP 3107. Focuses on 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 4658 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 4900 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 INERN- SHIP 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 EGU 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 4 and 5. 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: EGU 4945. 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 4 and 5. Secondary program prerequisites. Extra fee for applying lessons and activities from the methods course. 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 I. 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: EGU 2103. Class not open to freshmen.

EDTC 3930 PRACTICUM (1-5) Registration Approval: Instructor. Attribute: Upper Division.

Education
EDU 2103 FOUNDATIONS OF AMERICAN EDUCATION (3) Registration Approval: School of Education. Prerequisite: Admission to Professional Quarter I. 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 I. 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 curriculum, instruction, assessment and behavior management. Co-requisites: EDSP 3107, EDU 3104 and EDU 3105. Attribute: Upper Division. Class not open to freshmen and sophomores.

EDU 3101 FOUNDATIONS OF MULTICULTURAL EDUCATION (2) Registration Approval: School of Education. Prerequisite: Professional Quarter I. 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 3101. Attribute: Upper Division. Class not open to freshmen and sophomores.

EDU 3105 LABORATORY EXPERIENCE (3) Registration Approval: School of Education. Prerequisite: Professional Quarter I. 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 1 and 2. Explores teaching and planning methods and materials appropriate for middle school and senior high school students. Based on essential frameworks, the course considers various learning styles, moral implications, literary works and writing activities in creating and sharing ideas and projects. Corequisite: EDU 3361. Attribute: Upper Division.

EDU 3542 FIELD EXPERIENCE: ELEMENTARY MATH 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: EDMA 3357. Attribute: Upper Division. Class not open to freshmen and sophomores.

EDU 3559 FIELD EXPERIENCE: SECONDARY SCIENCE (1) Registration Approval: School of Education. Prerequisite: Admission to the School of Education. This field experience will provide experiences teaching secondary 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. 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 3359. 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 3942 SEPTEMBER EXPERIENCE (1) Registration Approval: School of Education. Prerequisite: Admission to the School of Education. This course requires three weeks of observation and assistance at the opening of a school. Available in a program that reflects the level and subject matter preferred by the pre-service 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 4230 ELEMENTARY GENERAL METHODS: THEORY INTO PRACTICE (2) Registration Approval: School of Education. Prerequisite: Admission to the School of Education. Presents general factors that affect learning in the elementary classroom; development of teacher-pupil relationships, lesson planning, behavior guidance, assessment and communicating with parents. Corequisites: EDRD 4231, EDU 4233 and EDU 4941. Attribute: Upper Division. Class not open to freshmen, sophomores and juniors.

EDU 4233 SOCIAL STUDIES METHODS: ELEMENTARY EMPIRICISM (3) Registration Approval: School of Education. Prerequisite: Admission to the School of Education. Explores inter-disciplinary approaches to teaching elementary social studies and develops strategies for implementation in the classroom. Corequisites: EDRD 4231, EDU 4230 and EDU 4941. Attribute: Upper Division. Class not open to freshmen, sophomores and juniors.

EDU 4240 GENERAL METHODS FOR TEACHING IN SECONDARY SCHOOLS (4) Registration Approval: School of Education. Prerequisite: Admission to the School of Education. Presents instructional theory, lesson planning, classroom management and related topics designed to enhance and to apply in a practical classroom setting. 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 middle school 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 4366 TEACHING SECONDARY SOCIAL STUDIES (3) Registration Approval: School of Education. Prerequisite: Professional Quarters 1 and 2. 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: ECS 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 4800 TEACHER AS PERSON (2) Registration Approval: School of Education. Prerequisite: Admission to the School of Education. This course will focus on professional and spiritual aspects of teaching school law, governance and finance. Seminar and case-study format will be used. Final portfolio checkout and job-search information will also be included. Concurrent enrollment is required with the final quarter of internship. Attribute: Upper Division. Class not open to freshmen, sophomores and juniors.

EDU 4845 SECONDARY STUDENT TEACHING SEMINAR (1) Registration Approval: School of Education. Prerequisite: Completion of Professional Quarters 1, 2 and 3. These seminars will provide an opportunity for student teachers to share experiences from their internship and 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 unique 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 4900 INDEPENDENT STUDY (1-5) Registration Approval: Independent Study Agreement. Prerequisite: Admission to School of Education. May be repeated for credit up to 15 credits. Attribute: Upper Division.

EDU 4940 STUDENT TEACHING IN THE ELEMENTARY SCHOOL (1-16) Registration Approval: School of Education. Prerequisites: See Professional Quarters 3, 4 and 5 elementary program prerequisites. Provides opportunity for observation and daily teaching for one quarter in elementary schools. Extra fee. May be repeated for credit up to 16 credits. 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: See Professional Quarters 4 and 5 elementary program prerequisites (first quarter). Provides opportunity for observation and daily teaching in elementary schools 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. Corequisite: EDU 4230. 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 of music 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: See Professional Quarters 4 and 5 elementary program prerequisites (first quarter). 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 4 and 5 Secondary program prerequisites. 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 4845. Attribute: Upper Division. Class not open to freshmen, sophomores and juniors.

EDU 4946 SECONDARY INTERNSHIP B (1-17) Registration Approval: School of Education. Prerequisite: 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. Corequisite: EDU 4845. Attribute: Upper Division. Class not open to freshmen, sophomores and juniors.

EDU 4947 ELEMENTARY INTERNSHIP: PHYSICAL EDUCATION (1-17) Registration Approval: School of Education. Prerequisites: See Professional Quarters 4 and 5 elementary program prerequisites (first quarter). Provides opportunity for observation and daily teaching of physical education 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 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. Corequisite: Completion of certification program. Observation and daily teaching in an international secondary school setting under the direction of a cooperating teacher.

Faculty
Lisa A. Bjork, Associate Professor of Education; Director of Continuing Education; B.A., Immaculate Heart College, 1967; Teaching Certificate, California State University at Los Angeles, 1969; M.Ed., Western Washington University,
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Engineering


**Janine Jones**, *Assistant Professor of School Psychology*, B.A., University of Texas at Austin, 1991; M.S., University of Southern California 1994; Ph.D., University of Texas at Austin, 1999. At SPU since 1999.


**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.


**David Steele**, *Associate Professor of Educational Administration; Director of Doctoral Studies; B.S., Eastern Montana College, 1966; M.S., Montana State University, 1971; Ed.D., University of Washington, 1994. At SPU since 1998.


**Engineering**

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(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**  
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 economically create 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 option in particular 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 Division of Science and 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. Students with SPU grade-point averages below 2.5 are normally not granted admission to the major. 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**

(129-32 credits; 62-65 upper division)

**Mathematics**

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

**Science**

- PHY 1121, 1122, 1123 Physics for Engineering ................. 15

**Computer Science**

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

**Engineering**

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

**Electrical Engineering**

- EE 1210 Introduction to Logic System Design .................. 5
- EE 2726, 2727 Electric Circuits I, II ............................. 8
- EE 3721, 3722 Electronics I, II ................................... 10
- EGR 4910 Senior Portfolio .......................................... 1

**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

**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 there assigned general education advisor to insure this requirement is met.

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.

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) 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
(142-146 credits; 64-68 upper division)
(Refer to page 64 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. 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 ..................................................... 2
MAT 2401 Linear Algebra ................................................ 3

Science
CHM 1211 General 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 ................................................................. 9-11
Choices include MAT 2376, 3724, CSC 2431, EE 3500, 
EGR 2391, 2891, 3401 3550, 3600, 3800.

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 I ...................................... 1
EGR 3000 Engineering Seminar ....................................... 1
EGR 3401 Intro to Engineering II 
(required for transfer students only) .............................. 2
EGR 3841 Dynamics ..................................................... 5
EGR 4740 Intern Preparation ......................................... 1
EGR 4940 Engineering 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
EE 3760 Computer Organization 
and Assembly Language ............................................... 5
EGR 4910 Senior Portfolio ............................................. 1
EE 4211, 4212, 4213 Microprocessor 
System Design I, II, III .............................................. 9
EE 4310 Electromagnetics .............................................. 5
EE 4450 Control System Design ..................................... 5

Total ............................................................................. 142-146

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:

EE 3760 Computer Organization 
and Assembly Language ............................................... 5
EE 1210 Introduction to Logic System Design ................... 5
EE 2726 Circuits I ......................................................... 4
EE 2727 Circuits II ......................................................... 4
EE 3028 Circuits III ....................................................... 4
EE courses (upper division) ............................................. 15

Total ............................................................................. 37

Requirements for the Engineering and Applied Science (EAS) Major
(103-140 credits; 27-50 upper division)
(Refer to page 64 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
MAT 1225, 1226 Calculus ................................................ 10
MAT 1228 Series and Differential Equations ...................... 5

Science
BIO 2101 General Biology .............................................. 5
CHM 1211 General Chemistry 
(required replaced with EGR 3841 if HS chemistry) ........... 5
PHY 1121, 1122, 1123 Physics 
for Science and Engineering ...................................... 15

Engineering Science
CSC 1230 Problem Solving and Programming .................... 5
EGR 1401 Intro to Engineering I ...................................... 1
EGR 1125 Engineering Study Prep (x3) ......................... 3
EE 3028 Circuits III Design .................................................. 4
EE 1210 Intro to Logic System Design ................................ 5
EGR 3841 Dynamics ...........................................................  5
EGR 2391 Introduction to Material Science ....................... 5
PHY 3401 Thermodynamics ................................................ 4
PHY 3312, 3313 Advanced Physics Lab .............................. 4
PHY 2321 Intermediate Physics .........................................  5
EGR 2891 Statics ................................................................. 4
EGR 4910 Senior Portfolio ................................................... 1

Total ............................................................................. 68-69

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**

BIO 3325 Genetics ........................................................... 5
CHM 2371, 2372 Organic Chemistry .................................. 10
CHM 3225 Chemical Equilibrium and Analysis ............... 5
EGR 2391 Introduction to Material Science (Biomaterials) .. 5
EGR 3800 Biomedical Engineering I .................................. 5
EGR 4311 Engineering Senior Design Lab .................... 5
EGR 4352 Cell Biology ..................................................... 5
Tech Electives (2) ......................................................... 10

Choices: CSC 2430, 2431, EGR 3226, 3841, MAT 2401,
EE 3410, PHY 4311, BIO 4418

**Total (including EAS core courses) ................. 119**

**Environmental Engineering**

BIO 2103 General Biology III ......................................... 5
BIO 3310 Ecology ............................................................ 5
CHM 2371 Organic Chemistry ......................................... 5
CHM 3225 Chemical Equilibrium and Analysis ............... 5
EGR 2391 Introduction to Material Science (Biomaterials) .. 5
EGR 3826 Quantitative and Instrumental Analysis ............ 5
EGR 3600 Environmental Engineering I ........................... 5
EGR 4311 Engineering Senior Design Lab .................... 5
Tech Electives (2) ......................................................... 10

Choices: CSC 2430, 2431, EE 3410, EGR 3841, MAT 2401,
EE 4310, PHY 4311

**Total (including EAS core courses) ................. 119**

**Mission Applications**

BUS 2700 Statistics ......................................................... 5
EE 3500 Power Systems .................................................. 5
EE 4950 Topics in EE (preferably telecommunications) ...... 5
EGR 3550 Alternative Energies ........................................ 5
EGR 3600 Environmental Engineering I ........................... 5
EGR 4311 Engineering Senior Design Lab .................... 5
EGR 4940 Engineering Internship ................................... 5

(taken for 5 credits not 1) ............................................. 5

**Total (including EAS core courses) ................. 103-104**

**Engineering Physics**

PHY 2321 Intermediate Physics ....................................... 5
PHY 3312, 3313 Advanced Physics Lab ........................... 4
PHY 3401 Thermodynamics ............................................ 4
EGR 2391 Introduction to Material Science (Biomaterials) .. 5
EGR 3841 Dynamics ..................................................... 5
EE 1210 Intro to Logic System Design ........................... 5
EE 3028 Circuits III Design ............................................ 4

EE 3721 Electronics I, II .................................................. 10
EE 3280 or 3410 Microcontrollers or Signals and Sysyems .. 5
EE 3760 Computer Organization .................................... 5
EE 4310 Electromagnetics .............................................. 5
MAT 2228 Multivariable Calculus ................................... 3
MAT 3724 Applied Analysis .......................................... 3
BIO xxx general education biology course .................... 5

**Total (including EAS core courses) ................. 131-132**

**Engineering Transfer Program Curriculum**

Students may wish to obtain their Christian liberal arts and basic engineering education at SPU. Later they may wish to transfer to another university and obtain an engineering degree not offered at SPU. Students 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)
CHM 3225 Chemical Equilibrium and Analysis ............... 5
PHY 1121, 1122, 1123 Physics .................................... 15

**Engineering Science**

CSC 1230 Problem Solving and Programming ................. 5
CSC 2430 Data Structures and Programming ................. 5
EE 1210 Introduction to Logic Circuit Design ............... 5
EE 2726, 2727 Circuits I, II (8)
EGR 2391 Material Science (5)
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 ...................................... 1

**Winter**

MAT 1226 Calculus ......................................................... 5
CSC 1230 or EE 1210 ..................................................... 5
or for EAS majors Exploratory Curriculum .................... 5
UCOR/UFDN 1000 ............................................................ 5

**Spring**

MAT 1228 Differential Equations .................................... 5
CSC 2430 Problem Solving and Programming ................. 5
or for EAS majors Exploratory 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 SYSTEMS PROGRAMMING (4) Prerequisites: CSC 2431 and either CSC 3750 or CSC/CPE/EE 3760. Introduction to operating systems and systems programming. Surveys systems software, operating system interface and functions; utilities and shell programming, linkers and loaders; and translators. Course Equivalent: CSC 3350. Attribute: Upper Division.

CPE 3550 COMMUNICATION SYSTEM ANALYSIS (5) Prerequisite: EE 3410. 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 4150 SOFTWARE ENGINEERING (4) Prerequisites: CSC 2431 and CSC 3150. Covers topics in software engineering, including team programming, project planning and management, SDL (software development life cycle) and software quality assurance. Surveys automated tools for use in software engineering. 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 SYSTEM DESIGN I (3) Prerequisites: EE/CPE 3280 and EE/GER 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 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. Special topics include design-for-test, user interface design and minimizing electromagnetic interference (EMI). Teams write a detailed technical report and submit their designs to a critical design review (CDR). Periodic progress reports and team presentations are required. Course Equivalent: EE 4212. Attribute: Upper Division.

CPE 4213 MICROPROCESSOR-BASED MIXED SIGNAL SYSTEM DESIGN III (3) Prerequisite: CPE/EE 4212. 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. Course Equivalent: EE 4213. Attribute: Upper Division and Writing Course.

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 4900 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, Thevenin's and Norton's Theorems, superposition. Introduction to operational amplifiers, inductance, capacitance and first-order state variable analysis. Includes lab problems and introduction to PSPICE and MATLAB computer software.

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 and transformers. Transformers and two-port network concepts. Includes lab problems. PSPICE and MATLAB.

EE 3000 ELECTRICAL ENGINEERING SEMINAR (1) Seminar and colloquia on topics related to various electrical engineering upper-division classes. Attribute: Upper Division.

EE 3028 ELECTRIC CIRCUITS III (4) Introduction to Laplace transforms applied to network analysis, transmission line theory, signal processing, filters, 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 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: CPE 3280. Attribute: Upper Division.

EE 3500 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 3550 COMMUNICATION SYSTEM ANALYSIS (5) Prerequisite: EE 3410. An introduction to principles of modern communication systems with 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, bipolar junction transistors, field-effect transistors and differential amplifiers. 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, oscillators, wave-shaping circuits, and dcs to ac conversion. 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. Course Equivalent: EGR 3730. Attributes: Upper Division and Writing Course.

EE 3760 COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE (5) Prerequisites: CSC 2430 and EE 1210. CSC 2431 is recommended. 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. Students 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. The instructor provides 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. Special topics include design-for-test, user-interface design and minimizing electromagnetic interference (EMI). Team members write a detailed technical report and submit their designs to a critical design review. Periodic progress reports and team presentations are required. Course Equivalent: CPE 4212. Attribute: Upper Division.

EE 4213 MICROPROCESSOR-BASED MIXED SIGNAL SYSTEM DESIGN III (3) Prerequisite: CPE/EE 4212. 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. Course Equivalent: CPE 4213. Attributes: Upper Division and Writing Course.

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, 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 SOLAR SYSTEM PHYSICS (2-5) Prerequisite: PHY 2321. 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 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 sophomores.

EE 4960 SENIOR PROJECT (1-5) Registration Approval: Instructor. Student works with faculty advisor and most likely an industrial representative on a mutually agreed upon project. Requires submission of application to EE chair three weeks prior to the start of the quarter. Attribute: Upper Division.

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 learning plan to improve 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 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 the industry, tours of technology companies and development of a Web-based student portfolio.

EGR 1501 AUTOCAD (1-2) This course is for all freshmen engineering non-honors students. It will include seminars and colloquia on topics related to the various EAS upper-division topics. 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 variety of separation, spectrosopic and electrochemical methods, includes engineering and clinical applications. Course Equivalent: CHM 3226. Attribute: Upper Division.

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

EGR 3402 INTRODUCTION TO ENGINEERING II (2) Required for all transfer engineering students. Introduction to the SPU engineering program. Provides instruction on the software and hardware that is utilized in the labs. This information is normally covered in beginning classes. Included is the development of a Web-based student portfolio. 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 3850 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 include solar, hydro, wind, biomass and hydrogen fuel cell. Includes examples of the use of each of these power sources. Attribute: Upper Division.

EGR 3780 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. 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, bioelectric phenomena, bioinstrumentation, biosignal processing, biomechanics, cardiovascular mechanics and ultrasound. Attribute: Upper Division.

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. Course Equivalent: PHY 3841. Attribute: Upper Division.

EGR 3871 TRANSPORT PROCESSES (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. Attribute: Upper Division.

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. Attribute: Upper Division.

EGR 4740 INTERNSHIP PREPARATION (1) Preparatory course for those taking EGR 4940 Engineering Internship. Includes resume preparation, report writing and oral presentation. A research paper is required. 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 prearranged 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 summer job with an engineering company. The job is fully coordinated between the intern’s faculty advisor and an engineer in the host company. The jobs are intended to be a professional learning experience for the student. Internship II is a company-sponsored design project during the senior year. All internships are designed to give the student experience in the real world engineering process. An oral and written report are presented at a scheduled seminar. 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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Melani I. Plett, Assistant Professor of Electrical Engineering; B.S.E.E., Seattle Pacific University, 1991; M.S.E.E., University of Washington, 1993; Ph.D. University of Washington, 2000. At SPU since 1993.


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