February 22, 2013
2:00-5:00
ADM 204

Undergraduate Academic Board
Agenda

I. Roll
( ) Dave Fitzgerald (CBPP) ( ) Ira Ortega (COE) ( ) Christina Stuve (SA) ( ) Adjunct vacancy
( ) Paola Banchero (CAS) ( ) Jeffrey Callahan (CTC) ( ) Francisco Miranda (FS CAS) ( ) USUAA vacancy
( ) Mari Ippolitio (CAS) ( ) Utpal Dutta (SOE) ( ) Alberta Harder (FSAL) Ex-Officio Members:
( ) Barbara Harville(CAS) ( ) Michael Hawfield (KPC) ( ) Soren Orley (FSAL) (x) Susan Kalina
( ) Len Smiley (CAS) ( ) Kevin Keating (LIB) ( ) FS at large vacancy ( ) Lora Volden
( ) Lynn Senette (COH) ( ) Joan O’Leary (Mat-su) ( ) Kathryn Hollis Buchanan(Kodiak) ( ) S&P
( ) Eileen Weatherby (COH) ( ) Vacant (Adjunct)

II. Approval of the Agenda (pg.1-2)

III. Approval of Meeting Summary (pg. 3-4)

IV. Administrative Report
A. Vice Provost for Undergraduate Academic Affairs Susan Kalina
B. University Registrar Lora Volden

V. Chair’s Report
A. UAB Chair- Dave Fitzgerald
B. GERC

VI. Program/Course Action Request- Second Readings
Chg BA A166 Small Business Management (3 cr)(3+0)(pg. 5-9)
Chg CSCE A311 Data Structures and Algorithms (3 cr)(3+0)(pg. 10-15)

VII. Program/Course Action Request- First Readings
Chg RUSS A490 Selected Topics in Russian Culture (3 cr)(3+0)(pg. 16-22)
Chg Associate of Arts (pg. 23-36)
Add CSCE, Prefix (pg. 37-39)
Chg CSCE A320 Operating Systems (3 cr)(3+0)(pg. 40-44)
Chg CSCE A351 Automata, Algorithms, and Complexity (3 cr)(3+0)(pg. 45-50)
Chg CSCE A360 Database Systems (3 cr)(3+0)(pg. 51-55)
Chg CSCE A365 Computer Networks (3 cr)(3+0)(pg. 56-59)
Chg CSCE A385 Computer Graphics (3 cr)(3+0)(pg. 60-65)
Chg CSCE A395 Internship in Computing (3 cr)(0+9)(pg. 66-69)
Chg CSCE A401 Software Engineering (3 cr)(3+0)(pg. 70-74)
Chg CSCE A411 Artificial Intelligence (3 cr)(3+0)(pg. 75-79)
Chg CSCE A412 Evolutionary Computing (3 cr)(3+0)(pg. 80-84)
Chg CSCE A431 Compilers (3 cr)(3+0)(pg. 85-88)
Chg CSCE A442 VLSI Circuit Design (3 cr)(3+0)(pg. 89-93)
Chg CSCE A445 Computer Design and Simulation (4 cr)(3+3)(pg. 94-97)
Chg CSCE A448 Computer Architecture (3 cr)(3+0)(pg. 98-103)
Chg CSCE A465 Computer and Network Security (3 cr)(3+0)(pg. 104-107)
Chg CSCE A470 Computer Science and Engineering Capstone Project (3 cr)(3+0)(GER)(pg. 108-113)
Chg CSCE A490 Topics in Computer Science and Computer Systems Engineering (3 cr)(3+0)(pg. 114-117)
Chg CSCE A495 Computing Internship Project (3 cr)(0+9)(pg. 118-122)
Chg CSCE A498 Individual Research (1-3 cr)(1-3+0)(pg. 123-125)
Chg RE A100 Introduction to Sustainable Energy (3 cr)(3+0)(pg. 126-130)
Chg RE A102 Applied Physics for Sustainable Energy (3 cr)(3+0)(pg. 131-135)
Chg RE A110 Introduction to Solar Photovoltaic Systems (1 cr)(1+0)(pg. 136-140)
Chg RE A120 Introduction to Solar Thermal Hot Water Systems (1 cr)(1+0)(pg. 141-144)
Chg RE A130 Introduction to Small Wind Systems (1 cr)(1+0)(pg. 145-148)
Chg RE A140 Home Energy Basics (1 cr)(1+0)(pg. 149-152)
Chg RE A203 Sustainable Energy Project Development (3 cr)(3+0)(pg. 153-157)
Chg RE A210 Cold Climate Construction (3 cr)(3+0)(pg. 158-163)
Chg OEC, Sustainable Energy (pg. 164-169)
Chg BS, Geomatics (pg. 170-187)
Chg AAS, General Business (pg. 188-192)

VIII. Old Business

IX. New Business
A. Draft Academic Program Suspension and Deletion Policies and Cover Memo Template (pg. 193-200)
B. First Reading of Purge Lists (pg. 201-204)
C. Memo Regarding Concentrations, Tracks, Options, and Emphasis (pg. 205)

X. Informational Items and Adjournment
I. Roll
(x) Dave Fitzgerald (CBPP) (x) Ira Ortega (COE) (x) Christina Stuive (SA) ( ) Adjunct vacancy
(x) Paola Banchero (CAS) (x) Jeffrey Callahan (CTC) (x) Francisco Miranda (FS CAS) ( ) USUAA vacancy
(x) Mari Ippolitio (CAS) ( ) Utpal Dutta (SOE) (x) Alberta Harder (FSAL) Ex-Officio Members:
(x) Paola Banchero (CAS) (x) Jeffrey Callahan (CTC) (x) Francisco Miranda (FS CAS) (x) USUAA vacancy
(x) Paola Banchero (CAS) ( ) Jeffrey Callahan (CTC) (x) Francisco Miranda (FS CAS) ( ) USUAA vacancy
(x) Barbara Harville (CAS) (x) Michael Hawfield (KPC) (x) Soren Orley (FSAL) (x) Susan Kalina
(x) Len Smiley (CAS) (x) Kevin Keating (LIB) ( ) FS at large vacancy (x) Lora Volden
(e) Lynn Senette (COH) (x) Joan O'Leary (Mat-su) (x) Kathrynn Hollis Buchanan (Kodiak) (x) S&P
(x) Eileen Weatherby (COH) ( ) Vacant (Adjunct)

II. Approval of the Agenda (pg.1-2)
Add UAB Disputed Curriculum Procedures and discussion of concentrations, tracks, options, and emphasis under new business

III. Approval of Meeting Summary (pg. 3-4)
Amend the sentence under Curriculum Process to read: Discussed what the faculty considers an appropriate curriculum review cycle and/or policy regarding maintaining currency in the curriculum.

IV. Administrative Report
A. Vice Provost for Undergraduate Academic Affairs Susan Kalina
   No report

B. University Registrar Lora Volden
   Summer registration opens February 28th and Fall registration opens April 1st; gave a reminder that changes to existing courses cannot be implemented in Fall 2013 after registration opens

V. Chair’s Report
A. UAB Chair- Dave Fitzgerald
   Constitution and by-laws does not mandate a joint UAB and GAB meeting, however, the board chairs agree that one is necessary. Joint meeting is tentatively scheduled for March 29th at 11:30.
   UAB and GAB chairs are looking at developing CAFÉ trainings for the curriculum process

B. GERC
   Both BA A151 and ENGL A111 were approved
   Discussed the new social science outcomes and how that might affect initiators

VI. Program/Course Action Request- Second Readings
Chg BA A151 Introduction to Business (3)(3+0)(pg. 5-11)
   Unanimously Approved

Chg ENGL A111 Introduction to Composition (3)(3+0)(pg. 12-27)
   Unanimously Approved

VII. Program/Course Action Request- First Readings
Chg Minor, Athletic Training (pg. 28)
   Accepted for first reading

Chg Bachelor of Science, Physical Education (pg. 29-49)
   Accepted for first reading

Chg BA A166 Small Business Management (3)(3+0)(pg. 50-54)
   Accepted for first reading
Chg    BA A480    Social Media Marketing  
(Stacked with BA A680) (3)(3+0)(pg. 55-65) 
Waive first reading, approve for second

Chg    ACCT A495    Advanced Accounting Internship (3)(0+9)(pg. 66-70) 
Waive first reading, approve for second

Chg    CSCE A201    Computer Programming I (4)(3+2)(pg. 71-75) 
Waive first reading, approve for second

Chg    CSCE A202    Object-Oriented Programming (3)(3+0)(pg. 76-81) 
Waive first reading, approve for second

Chg    CSCE A211    Computer Programming II (4)(3+2)(pg. 82-86) 
Waive first reading, approve for second

Chg    CSCE A241    Computer Hardware Concepts 
(Cross Listed with EE A241) (4)(3+3)(pg. 87-92) 
Waive first reading, approve for second

Chg    EE A241    Computer Hardware Concepts 
(Cross Listed with CSCE A241) (4)(3+3)(pg. 93-98) 
Waive first reading, approve for second

Chg    CSCE A248    Computer Organization and Assembly Language Programming 
(3)(3+0)(pg. 99-105) 
Waive first reading, approve for second

Chg    CSCE A302    Object-Oriented Design Patterns (3)(3+0)(pg. 106-109) 
Waive first, approve for second

Add    CSCE A305    Android Programming (3)(3+0)(pg. 110-113) 
Waive first reading, approve for second

Chg    CSCE A311    Data Structures and Algorithms (3)(3+0)(pg. 114-119) 
Accepted for first reading

Chg    CSCE A331    Programming Language Concepts (3)(3+0)(pg. 120-125) 
Waive first reading, approve for second

Chg    CSCE A342    Digital Circuits Design (3)(3+0)(pg. 126-130) 
Waive first reading, approve for second

VIII. Old Business
A. Curriculum Review Process
   Discuss what the faculty might consider an appropriate curriculum review cycle and/or policy 
   regarding maintaining currency in the curriculum. 
   Created a subcommittee to devise a policy regarding the curriculum review cycle with the intent of 
   maintaining currency in the curriculum. Michael Hawfield volunteered to chair the 
   subcommittee.

IX. New Business
A. Draft Academic Program Suspension and Deletion Policies and Cover Memo Template 
   (pg. 131-138)

B. UAB Disputed Curriculum Procedures – Mari Ippolito 
   Discuss how to approach curriculum procedures regarding improper coordination.

X. Informational Items and Adjournment
1a. School or College
   CB CBPP
1b. Division
   ADBP Division of Business Programs
1c. Department
   BA

2. Course Prefix
   BA
3. Course Number
   A166
4. Previous Course Prefix & Number
   N/A
5a. Credits/CEUs
   3
5b. Contact Hours
   (Lecture + Lab) (3+0)

6. Complete Course Title
   Small Business Management
   Abbreviated Title for Transcript (30 character)

7. Type of Course
   ☑ Academic  ☐ Preparatory/Development  ☐ Non-credit  ☐ CEU  ☐ Professional Development

8. Type of Action:  ☑ Add  ☐ Change  ☐ Delete

   If a change, mark appropriate boxes:
   ☑ Prefix  ☐ Course Number  ☐ Credits  ☐ Title  ☐ Repeat Status  ☐ Grading Basis  ☐ Cross-Listed/Stacked  ☐ Other Restrictions
   ☑ Course Description  ☐ Co-requisites  ☐ Registration Restrictions

9. Repeat Status No  # of Repeats  Max Credits
   10. Grading Basis
       ☑ A-F  ☐ P/NP  ☐ NG

11. Implementation Date
    From:  Fall/2013  To:  9999

12. ☐ Cross Listed with
    ☐ Stacked with

13a. Impacted Courses or Programs: List any programs or college requirements that require this course.

   Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at www.uaa.alaska.edu/governance.

<table>
<thead>
<tr>
<th>Impacted Program/Course</th>
<th>Catalog Page(s) Impacted</th>
<th>Date of Coordination</th>
<th>Chair/Coordinator Contacted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. See attached</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Initiator Name (typed): Gary Selk  Initiator Signed Initials:  Date:

13b. Coordination Email
    Date: 02/01/2013
    submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison
    Date: 02/01/2013

14. General Education Requirement
    Mark appropriate box:
    ☐ Oral Communication  ☐ Written Communication  ☐ Quantitative Skills  ☐ Humanities
    ☐ Fine Arts  ☐ Social Sciences  ☐ Natural Sciences  ☐ Integrative Capstone

15. Course Description (suggested length 20 to 50 words)
    Introduces business planning as a key to successful small business management. Examines practical aspects of management for starting and operating a small business. Assists students in furthering their understanding of personal finance, business planning, marketing, production, and business finance.

16a. Course Prerequisite(s) (list prefix and number)
    N/A
16b. Test Score(s)
    N/A
16c. Co-requisite(s) (concurrent enrollment required)
    N/A
16d. Other Restriction(s)
    ☐ College  ☐ Major  ☐ Class  ☐ Level
16e. Registration Restriction(s) (non-codable)
    N/A
17. ☑ Mark if course has fees
    Standard CBPP computer lab fee

18. ☐ Mark if course is a selected topic course

19. Justification for Action
    To update the outline, textbook, and bibliography

Initiator (faculty only)  Date
   ☑ Approved  ☐ Disapproved
   Gary Selk
   Initiator (TYPE NAME)

☐ Approved  ☐ Disapproved  Dean/Director of School/College  Date

☐ Approved  ☐ Disapproved  Undergraduate/Graduate Academic  Date

☐ Approved  ☐ Disapproved  Board Chairperson  Date

☐ Disapproved  Provost or Designee  Date
### 13a. Impacted courses or programs BA A166

<table>
<thead>
<tr>
<th>Impacted program/course</th>
<th>Catalog page(s)</th>
<th>Date of coordination</th>
<th>Chair/Coordinator contacted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Art, Digital Photography Concentration, AAS</td>
<td>97</td>
<td>02/01/2013</td>
<td>Celia Anderson</td>
</tr>
<tr>
<td>Digital Art, Darkroom/Digital Concentration, AAS</td>
<td>98</td>
<td>02/01/2013</td>
<td>Celia Anderson</td>
</tr>
<tr>
<td>Small Business Management, Undergraduate Certificate</td>
<td>137</td>
<td>02/01/2013</td>
<td>Steve Horn</td>
</tr>
<tr>
<td>Small Business Management, AAS</td>
<td>139</td>
<td>02/01/2013</td>
<td>Ed Forrest</td>
</tr>
</tbody>
</table>
I. Date Initiated
   February 19, 2013

II. Course Information
   College/School: College of Business and Public Policy
   Department: Business Administration
   Program: Associate of Applied Science, Small Business Administration;
            Associate of Applied Science, Digital Art, Digital Photography Concentration;
            Associate of Applied Science, Digital Art, Darkroom/Digital Concentration
   Course Title: Small Business Management
   Course Number: BA A166
   Credits: 3
   Contact Hours: 3 per week x 15 weeks = 45 hours
                  0 lab hours
                  6 hours outside of class per week x 15 weeks = 90 hours
   Grading Basis: A - F
   Course Description: Introduces business planning as a key to successful small business management. Examines practical aspects of management for starting and operating a small business. Assists students in furthering their understanding of personal finance, business planning, marketing, production, and business finance.
   Course Prerequisites: N/A
   Registration Restrictions: N/A
   Fees: Standard CBPP computer lab fee

III. Course Activities
   A. Lectures and discussions
   B. In-class exercises
   C. Guest speakers
   D. Research projects

IV. Course Level Justification
   This 100-level course examines the basic principles of starting and operating a small business.

V. Outline
   A. The Dynamic Role of Small Business
      1. Start your small business
      2. Family owned businesses
      3. Forms of ownership
B. How to Plan and Organize a Business
   1. Plan, organize, and manage a small business
   2. Obtain the right financing for your business

C. How to Market Goods and Services
   1. Develop marketing strategies
   2. Promotion and distribution

D. How to Organize and Manage the Business
   1. Human resources
   2. Maintain relationships with your employees

E. How to Operate the Business
   1. Facility layout
   2. Purchasing and inventory control

F. Basic Financial Management
   1. Profit planning
   2. Budget, operations control, and taxes

G. Providing Security for the Business
   1. Risk management
   2. Insurance
   3. Crime prevention

VI. Suggested Text


VII. Bibliography


A. Instructional Goals.
The instructor will:

1. Present an overview of small business management.
2. Explain the value of ethical decision making and social responsibilities of small business ownership.
3. Explain the various forms of business planning.
4. Discuss business failure and explain ways to recognize and avoid common pitfalls.
5. Explain how to write a comprehensive business plan.
6. Discuss human resource management.
7. Discuss marketing requirements of small business ownership.
8. Explain how to analyze various key financial statements.
9. Explain how to calculate break-even.
10. Explain how to forecast sales and the importance of cash-flow analysis.

B. Student Learning Outcomes.
Students will be able to:

<table>
<thead>
<tr>
<th>Students will be able to:</th>
<th>Assessment Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Demonstrate ethical decision-making.</td>
<td>In-class exercise and quiz</td>
</tr>
<tr>
<td>2. Demonstrate working knowledge of various functions of small business ownership.</td>
<td>Research project</td>
</tr>
<tr>
<td>3. Describe the common pitfalls of small business ownership and how to avoid them.</td>
<td>Quizzes, homework and exam</td>
</tr>
<tr>
<td>4. Describe the various functions of human resource management.</td>
<td>Quizzes, homework and exam</td>
</tr>
<tr>
<td>5. Demonstrate knowledge of sales forecasting, cash-flow analysis, and break-even.</td>
<td>Quizzes and exam</td>
</tr>
<tr>
<td>6. Explain the difference between insurable risk and uninsurable risk and discuss how to control risk.</td>
<td>Quizzes and exam</td>
</tr>
</tbody>
</table>
# Course Action Request

**University of Alaska Anchorage**

Proposal to Initiate, Add, Change, or Delete a Course

### 1a. School or College

EN SOENGR

### 1b. Division

No Division Code

### 1c. Department

Computer Science and Engineering

### 2. Course Prefix

CSCE

### 3. Course Number

A311

### 4. Previous Course Prefix & Number

CS A330

### 5a. Credits/CEUs

3

### 5b. Contact Hours

(Lecture + Lab) (3+0)

### 6. Complete Course Title

Data Structures and Algorithms

**Abbreviated Title for Transcript (30 character)**

### 7. Type of Course

- [x] Academic
- [ ] Preparatory/Development
- [ ] Non-credit
- [ ] CEU
- [ ] Professional Development

### 8. Type of Action:

- [x] Add
- [ ] Change
- [ ] Delete

If a change, mark appropriate boxes:

- [x] Prefix
- [x] Credits
- [x] Title
- [x] Grading Basis
- [x] Course Description
- [x] Test Score Prerequisites
- [x] Other Restrictions
- [x] Other Update Course Content Guide, Division Code, Department Code

### 9. Repeat Status No

- [ ] # of Repeats
- [ ] n/a
- [x] Max Credits
- [ ] n/a

### 10. Grading Basis

- [x] A-F
- [ ] P/NP
- [x] NG

### 11. Implementation Date

- [ ] semester/year
- [ ] From: Fall/2013
- [ ] To: 99/9999

### 12. Cross Listed with

- [ ] Stacked with

#### Cross-Listed Coordination Signature

### 13a. Impacted Courses or Programs:

<table>
<thead>
<tr>
<th>Program/Course</th>
<th>Date of Coordination</th>
<th>Chair/Coordinator Contacted</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.A., B.S., Computer Science</td>
<td>12/10/2012</td>
<td>Kenrick Mock</td>
</tr>
<tr>
<td>BSE CSE, Required course</td>
<td>12/10/2012</td>
<td>Kenrick Mock</td>
</tr>
<tr>
<td>BS Natural Science, Selective</td>
<td>12/10/2012</td>
<td>Khrys Duddleston</td>
</tr>
</tbody>
</table>

**Initiator Name (typed): Martin Cenek**

**Initiator Signed Initials:**

**Date:**

### 13b. Coordination Email

- [ ] submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

**Date:** 12/10/2012

### 13c. Coordination with Library Liaison

- [ ] Date:** 12/10/2012

### 14. General Education Requirement

**Mark appropriate box:**

- [ ] Oral Communication
- [ ] Written Communication
- [ ] Quantitative Skills
- [ ] Humanities
- [ ] Fine Arts
- [ ] Social Sciences
- [ ] Natural Sciences
- [ ] Integrative Capstone

### 15. Course Description

(suggested length 20 to 50 words)

Representation and organization of digital information in the form of effective and efficient data structures, manipulation of data structures in a procedural fashion, and the analysis and evaluation of various algorithms. The following topics will be covered: Abstract Data Types (ADT), arrays, tables, linked lists, stacks, queues, trees, sorting, searching, graphs, hashing, spanning trees, disjoint sets, and heaps.

### 16a. Course Prerequisite(s)

(list prefix and number or test code and score)

(CSCE A211 and MATH A231) with a minimum grade of C.

### 16b. Co-requisite(s)

(concurrent enrollment required)

n/a

### 16c. Other Restriction(s)

- [ ] College
- [ ] Major
- [ ] Class
- [ ] Level

### 16d. Registration Restriction(s)

(non-codable)

n/a

### 17. Mark if course has fees

- [x] Yes, standard SOE fee

### 18. Mark if course is a selected topic course

### 19. Justification for Action

Revision to establish a course common to both the Computer Science and Computer Systems Engineering programs and update the course content guide. The course title rearranged to emphasize data structures. Addition of MATH A231 as a prerequisite to better prepare students for the logical and mathematical analysis in the course.
<table>
<thead>
<tr>
<th>Role</th>
<th>Approved</th>
<th>Disapproved</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiator (faculty only)</td>
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<td></td>
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<tr>
<td>Martin Cenek</td>
<td></td>
<td></td>
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<tr>
<td>Initiator (TYPE NAME)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Dean/Director of School/College</td>
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<tr>
<td>Department Chair</td>
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<tr>
<td>Undergraduate/Graduate Academic Board Chair</td>
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<tr>
<td>College/School Curriculum Committee Chair</td>
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<tr>
<td>Provost or Designee</td>
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</tr>
</tbody>
</table>
I. Revision Date: February 5, 2013

II. Course Information
   A. College: School of Engineering
   B. Course Subject/Number: CSCE A311
   C. Credits: 3
   D. Contact Hours: (3+0) 45 contact lecture hours (3 contact lecture hours/week x 15 weeks = 45) plus 90 hours outside work (6 hours outside lecture/week x 15 weeks = 90) for a total of 135 hours
   E. Course Title: Data Structures and Algorithms
   F. Repeat Status: No
   G. Grading Basis: A-F
   H. Course Description: Representation and organization of digital information in the form of effective and efficient data structures, manipulation of data structures in a procedural fashion, and the analysis and evaluation of various algorithms. The following topics will be covered: ADT, arrays, tables, linked lists, stacks, queues, trees, sorting, searching, graphs, hashing, spanning trees, disjoint sets, and heaps.
   I. Course Prerequisites: (CSCE A211 and MATH A231) with a minimum grade of C.
   J. Fees: Yes, standard SOE fee

III. Course Level Justification

   This is the third course in the programming sequence. Familiarity of 200 level programming concepts is necessary to build data structures and familiarity of 200 level concepts from discrete mathematics is necessary to analyze algorithms. This course prepares students for other upper division courses that require an understanding of data structures and algorithms.

IV. Instructional Goals and Student Learning Outcomes

<table>
<thead>
<tr>
<th></th>
<th>Instructional Goals. The instructor will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Aid students to achieve an expert knowledge of how to represent and organize digital information by variety of data-structures applicable in most object-oriented languages.</td>
</tr>
<tr>
<td>2.</td>
<td>Introduce students to the techniques of manipulating these structures by algorithms to perform common actions on the data structures such as finding, retrieving, adding, and deleting information.</td>
</tr>
<tr>
<td>3.</td>
<td>Illustrate benefits and drawbacks of different algorithms by analytically and experimentally evaluating algorithmic efficiency.</td>
</tr>
<tr>
<td>4.</td>
<td>Provide students with the background knowledge and skills needed to successfully design, implement, modify and evaluate digital information in subsequent upper-division computer science courses.</td>
</tr>
</tbody>
</table>
**B. Student Learning Outcomes.** Students will be able to:

<table>
<thead>
<tr>
<th></th>
<th>Assessment method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Design suitable information representations for a variety of problems.</td>
<td>Assignments, Quizzes, Exams</td>
</tr>
<tr>
<td>2. Describe appropriate algorithms and data structures for a number of well-defined problems.</td>
<td>Assignments, Quizzes, Exams</td>
</tr>
<tr>
<td>3. Design algorithms to solve given problems using techniques such as divide-and-conquer.</td>
<td>Assignments, Quizzes, Exams</td>
</tr>
<tr>
<td>4. Implement algorithms and data structures in a computer programming language: C++ or Java.</td>
<td>Assignments, Quizzes, Exams</td>
</tr>
<tr>
<td>5. Analyze the time and space efficiency of an algorithm, use the big-O notation.</td>
<td>Assignments, Quizzes, Exams</td>
</tr>
<tr>
<td>6. Measure the time and space requirements of an algorithm.</td>
<td>Assignments, Quizzes, Exams</td>
</tr>
</tbody>
</table>

**V. Guidelines for Evaluation**

A. Assignments  
B. Exams  
C. Quizzes

**VI. Topical Course Outline**

1. Design and analysis of algorithms  
   a. From problems to programs  
   b. Data types, data structures and abstract data types  
   c. Program run time calculations: asymptotic notation, summation, recurrence  
   d. Structured programming concepts

2. Basic data types  
   a. Linked lists  
   b. Stacks  
   c. Queues  
   d. Last In First Out (LIFO), First In First Out (FIFO), circular, priority  
   e. Mappings  
   f. Stacks and recursive procedures

3. Trees  
   a. The Abstract Data Type (ADT) tree  
   b. Implementation of trees  
   c. Binary trees

4. Basic operation on sets  
   a. Introduction to sets  
   b. Bit-vector and linked list implementation of sets  
   c. Dictionaries and their implementation  
   d. Hash tables
e. Priority queues

5. Advanced set representation methods
   a. Binary search trees
   b. Sets with the UNION and FIND operations
   c. An ADT with UNION and SPLIT

6. Graphs
   a. Basic definitions
   b. Single-source and all-paths shortest path problem
   c. Traversal of directed graphs, Breadth First Search, Depth First Search
   d. Minimum cost spanning trees: Kruskal, Prim
   e. Directed graph traversals

7. Algorithm analysis techniques
   a. Divide and conquer algorithms
   b. Dynamic programming

8. Data structures and algorithms for external storage
   a. External sorting
   b. Quick sort, Merge sort, Selection sort, Insertion sort, Heap sort, Bucket sort
   c. External search trees

VII. Suggested Texts


VIII. Bibliography


* denotes classic text
# Course Action Request
## University of Alaska Anchorage
### Proposal to Initiate, Add, Change, or Delete a Course

<table>
<thead>
<tr>
<th>1a. School or College</th>
<th>1b. Division</th>
<th>1c. Department</th>
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</thead>
<tbody>
<tr>
<td>AS CAS</td>
<td>AHUM Division of Humanities</td>
<td>Languages</td>
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<thead>
<tr>
<th>2. Course Prefix</th>
<th>3. Course Number</th>
<th>4. Previous Course Prefix &amp; Number</th>
<th>5a. Credits/CEUs</th>
<th>5b. Contact Hours</th>
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<tbody>
<tr>
<td>RUSS</td>
<td>A490</td>
<td>RUSS A490A</td>
<td>3</td>
<td>(Lecture + Lab) (3+0)</td>
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<th>6. Complete Course Title</th>
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<tr>
<td>Selected Topics in Russian Culture</td>
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<tr>
<td>ST: Russian Culture</td>
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<tr>
<td>Abbreviated Title for Transcript (30 character)</td>
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<th>8. Type of Action</th>
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<th>Credits</th>
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<th>Title</th>
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<th>Course Description</th>
<th>Test Score Prerequisites</th>
<th>Other Restrictions</th>
<th>Contact Hours</th>
<th>Repeat Status</th>
<th>Cross-Listed/Stacked</th>
<th>Co-requisites</th>
<th>Registration Restrictions</th>
<th>Other CCG Update (please specify)</th>
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| 13a. Impacted Courses or Programs: | List any programs or college requirements that require this course. |

<table>
<thead>
<tr>
<th>Impacted Program/Course</th>
<th>Date of Coordination</th>
<th>Chair/Coordinator Contacted</th>
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<tr>
<td>BA International Studies</td>
<td>January 27, 2013</td>
<td>Professor Dorn Van Dommelen</td>
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<td>2.</td>
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<th>Initiator Name (typed): Amanda Murphy</th>
<th>Initiator Signed Initials:</th>
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<th>13b. Coordination Email</th>
<th>Date: January 27, 2013</th>
<th>13c. Coordination with Library Liaison</th>
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<td>submitted to Faculty Listserv:</td>
<td>(<a href="mailto:uaa-faculty@lists.uaa.alaska.edu">uaa-faculty@lists.uaa.alaska.edu</a>)</td>
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<th>14. General Education Requirement</th>
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<tr>
<td>Oral Communication</td>
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<td>Fine Arts</td>
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<thead>
<tr>
<th>15. Course Description (suggested length 20 to 50 words)</th>
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<tr>
<td>Focuses on critical analysis of diverse artistic traditions from Russian-speaking communities using a variety of disciplinary methodologies (e.g. historical, cultural, socio-political) and related terminology. Enhances Russian language skills in writing, reading, speaking, listening, and cross-cultural literacy. Special note: Course may be repeated for credit with change of subtitle. Course conducted in Russian.</td>
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<tr>
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<tbody>
<tr>
<td>RUSS A302 with a minimum grade of C.</td>
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<th>17. Mark if course has fees</th>
<th>18. Mark if course is a selected topic course</th>
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<tr>
<th>19. Justification for Action</th>
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<tr>
<td>Updating of CCG to reflect new course description, course number, contact hours, registration restrictions, prerequisites, instructional goals, student learning outcomes, and bibliography.</td>
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<tr>
<td>Initiator (faculty only)</td>
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<tr>
<td>-------------------------</td>
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<tr>
<td>Amanda Murphy</td>
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<tr>
<th>College/School Curriculum Committee Chair</th>
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I. Initiation Date: January 11, 2013

II. Course Information:
   A. College: College of Arts and Sciences
   B. Course Title: Selected Topics in Russian Culture
   C. Course Subject/Number: RUSS A490
   D. Credit Hours: 3.0
   E. Contact Time: 3 + 0 hours per week
   F. Grading Information: A-F
   G. Course Description: Focuses on critical analysis of diverse artistic traditions from Russian-speaking communities using a variety of disciplinary methodologies (e.g. historical, cultural, socio-political) and related terminology. Enhances Russian language skills in writing, reading, speaking, listening, and cross-cultural literacy.

   Special note: Course may be repeated for credit with change of subtitle. Course conducted in Russian.

   H. Status of Course Relative to Degree or Certificate Programs:
      Course may be used as an elective to satisfy the upper-division component of a Russian major or minor.

   I. Course Attributes: Applies toward the upper-division requirement for Russian majors and minors.

   J. Lab Fees: Yes

   K. Coordination: UAA Faculty List Serve

   L. Course Prerequisite: Russian A302 with a minimum grade of C.
III. Instructional Goals and Student Learning Outcomes:

**Instructional Goals:**

1. Conduct the class in Russian, soliciting student participation via discussion of course material.
2. Present representative works and relate them to the historical and cultural contexts in which they were composed.
3. Present opportunities for the students to enhance linguistic proficiency and rhetorical skills through engagement with selected works.
4. Guide students in critically analyzing and interpreting representative works, using appropriate disciplinary approaches and terminology.

<table>
<thead>
<tr>
<th>Student Learning Outcomes</th>
<th>Assessment Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrate effective analytical writing skills in Russian through the interpretation of the material studied in the course.</td>
<td>Papers</td>
</tr>
<tr>
<td></td>
<td>Exams and quizzes</td>
</tr>
<tr>
<td>Employ appropriate disciplinary approaches and terminology in critical analyses.</td>
<td>Exams and quizzes</td>
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<tr>
<td></td>
<td>Class discussions</td>
</tr>
<tr>
<td></td>
<td>Papers</td>
</tr>
<tr>
<td></td>
<td>Class presentations</td>
</tr>
<tr>
<td>Demonstrate enhancement and refinement of oral skills in Russian.</td>
<td>Class discussions</td>
</tr>
<tr>
<td></td>
<td>Class presentations</td>
</tr>
<tr>
<td>Demonstrate appropriate understanding of the historical and cultural context in which the discussed works were composed.</td>
<td>Exams and quizzes</td>
</tr>
<tr>
<td></td>
<td>Class discussions</td>
</tr>
<tr>
<td></td>
<td>Papers</td>
</tr>
<tr>
<td></td>
<td>Class presentations</td>
</tr>
</tbody>
</table>

IV. Course Activities:

This course reflects a balance of learner-centered, small-group collaboration as well as instructor-delivered lesson format based on analysis and interpretation of authentic Russian cultural works.

V. Course-level Justification:

Course requires prior formal study of college Russian grammar and composition at the upper-division level, building upon the concepts presented in RUSS A302.
VI. Sample Course Outline:
The following is a possible version of the course: “Russian Cinema and Conversation.”

A. Terminology for Discussing Films in Russian
B. Theoretical Background: The Myth of the “Great Family” in Soviet Art
C. Historical Background of the Post-Soviet Era: My Perestroika
D. The Stalinist Legacy in Post-Soviet Films: Утомленные солнцем (Burnt by the Sun) and Вор (The Thief)
E. Social and Political Problems in Post-Soviet Russia: Брат (Brother), Окно в Париж (Window to Paris), and Кавказский пленник (Prisoner of the Mountains)

VII. Suggested Texts:


VIII. Bibliography:


The College of Arts and Sciences (CAS) proposes adding four divisional emphases to the Associate of Arts program: Fine Arts, Humanities, Natural Sciences, and Social Sciences. These emphases would be geared to students academically unprepared for admittance into a baccalaureate degree program based on high school grades and/or placement testing in mathematics, reading, and composition. In addition to the existing General Studies AA, these emphases would provide students with additional pathways to succeed in the disciplinary area of their choice.

Although CAS awarded 129 AA degrees in 2011-2012 (256 MAU total), students typically see a baccalaureate degree as more prestigious than the AA, so they declare for a Bachelor of Arts or Bachelor of Sciences rather than the more accessible degree. They often do so even when planning to transfer well before completing the baccalaureate or when there is a likelihood that the baccalaureate is not achievable due to academic, job-related, family or other impediments. In some cases, baccalaureate students have taken the necessary coursework at UAA but leave without realizing they have done so, and so leave with no degree.

There are several reasons for developing emphases in the AA:

- Emphases focused on completing GERs for baccalaureate degrees will prepare students for further work at the baccalaureate level better than the existing General Program AA.
- For under-prepared students, the AA is more readily achievable than a BS or BA. Some of these students are overwhelmed by the number of baccalaureate degree requirements and fail to persist, or they lose direction when they fail to achieve a specific degree goal. These students might see the AA as more desirable if they saw it as a clear path leading toward their desired field.
- UAA’s graduation rates will improve. UAA is one of the few universities with a community college function as part of its mission; most students spend one or more years at a community college before beginning a baccalaureate program. As a consequence of our combined mission, our graduation rate is one of the lowest in the nation. If underprepared students were to complete the AA prior to beginning the baccalaureate our graduation rates would increase as these students would enter a baccalaureate program only after completing the AA, significantly shortening (on paper) time to graduation for baccalaureate degrees.
- Students who would otherwise have declared for the BA/BS and leave UAA before degree completion would have a better chance of completing an AA degree. To make the AA more appealing to students, UAA could consider developing a pass-through mechanism from the AA to the BA/BS so students who have completed the appropriate emphasis are automatically allowed to progress into a baccalaureate degree program without having to pay a second fee, as UAS does now.
• Having an AA degree would make transferring easier. Articulated Transfer Programs have become increasingly popular in many states, often mandated by state legislators, to ensure that students can smoothly transition into state-funded universities from their community colleges or into specific degree programs. Such transfer agreements might be crafted with individual departments here at UAA.

• Advising would be easier. Having more focused AA degree emphases will “take out some of the hassle” for students deciding which courses to take (this was a concern of President Gamble to the Faculty Senate in September). According to Linda Morgan, the Director of the Advising and testing Center, the Associate of Arts is the “most valuable tool the institution has for low performing students.”
Program/Prefix Action Request  
University of Alaska Anchorage  
Proposal to Initiate, Add, Change, or Delete a Program of Study or Prefix

1a. School or College  
AS CAS  

1b. Department  
N/A

2. Complete Program Title/Prefix  
Associate of Arts

3. Type of Program  
Choose one from the appropriate drop down menu:  
Undergraduate:  
Associate of Arts  
or  
Graduate:  
CHOOSE ONE

This program is a Gainful Employment Program:  
☐ Yes  
or  
☒ No

4. Type of Action:  
PROGRAM  
☐ Add  
☒ Change  
☐ Delete

PREFIX  
☐ Add  
☐ Change  
☐ Inactivate

5. Implementation Date (semester/year)  
From: F/2013  
To: 99/99

6a. Coordination with Affected Units  
Department, School, or College: CAS

Initiator Name (typed): Suzanne Forster  
Initiator Signed Initials: _________

Date:________________

6b. Coordination Email submitted to Faculty Listserv (uaa-faculty@lists.uaa.alaska.edu)  
Date: 1/25/13

6c. Coordination with Library Liaison  
Date: 1/25/13

7. Title and Program Description - Please attach the following:  
☒ Cover Memo  
☒ Catalog Copy in Word using the track changes function

8. Justification for Action  
To expand AA students' program choices, improve retention, provide additional advising tools, and improve graduation rates.

Initiator (faculty only)  
Suzanne Forster, Chair, AA Degree Program

Initiator (TYPE NAME)

☐ Approved  
☐ Disapproved  
Dean/Director of School/College

Date

☐ Approved  
☐ Disapproved  
Department Chair  
Date

☐ Approved  
☐ Disapproved  
Undergraduate/Graduate Academic  
Date

☐ Approved  
☐ Disapproved  
Board Chair

Date

☐ Approved  
☐ Disapproved  
College/School Curriculum Committee Chair  
Date

☐ Approved  
☐ Disapproved  
Provost or Designee  
Date

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From Chapter 10 Page 80

Associate Degrees
The University of Alaska Anchorage offers two types of associate degrees, both of which require the completion of 60 credits or more:

• The Associate of Arts (AA) degree combines broad studies in written communication, oral communication, humanities, mathematics, natural sciences and social sciences, with elective coursework selected by the student. The degree provides broad exposure to systems of thought and inquiry, allows exploration of a variety of disciplines and learning experiences, and provides a solid foundation for further study at the baccalaureate level. The AA degree offers a General Studies emphasis and emphases in Fine Arts, Humanities, Natural Sciences, and Social Sciences. The AA degree is administered by the College of Arts and Sciences (CAS). The complete program description is found under the CAS section of this chapter.

• Associate of Applied Science (AAS) degrees provide applied or specialized studies that are used to satisfy a student’s specific educational needs. Many AAS programs prepare students for work in a particular field of employment. Some AAS degrees are designed to provide a foundation for a specific related baccalaureate degree. Students in AAS degree programs build knowledge and skills needed to carry out specific tasks while they develop abilities in the essential elements of communications, computation and human relations.

From Chapter 10 Page 90

ASSOCIATE OF ARTS

The Associate of Arts (AA) degree provides a solid foundation in mathematics, written and oral communication, the natural and social sciences, the humanities, and fine arts. The AA degree prepares students for career advancement and baccalaureate programs and to better understand their world. The AA offers a General Studies emphasis and, for students planning to pursue a baccalaureate degree, emphases in Fine Arts, Humanities, Natural Sciences, and Social Sciences.

Student Learning Outcomes
Students graduating with an AA degree from UAA will be able to:

• Communicate effectively with diverse audiences (individual, group, or public) using a variety of verbal and nonverbal communication strategies;
• Respond effectively to writing assignments using appropriate genres and standard written English;
• Use library and electronic research responsibly and appropriately;
• Identify, describe, and evaluate the aesthetic, historical and philosophical aspects of material culture, including artistic expressions, language, and texts;
• Apply critical thinking skills to identify the premises and conclusions of arguments, evaluate their soundness, and recognize common fallacies;
• Use appropriate mathematical language and symbols to develop and communicate solutions and demonstrate quantitative and analytical skills and knowledge;
• Articulate the fundamentals, developments, and impacts of one or more scientific disciplines and develop and analyze evidence-based conclusions about the natural and social world.

Admission Requirements
Complete the Undergraduate Certificate and Associate Degree Program Admission Requirements located at the beginning of Chapter 7, Academic Standards and Regulations.

General University Requirements
Complete General University Requirements for the Associate of Arts located at the beginning of this chapter.

Degree Requirements

• This degree requires a minimum of 60 credits.
• Students must complete at least 15 credits in residence.
• Students must earn a cumulative GPA of at least a 2.00 at UAA.
• All courses must be at the 100 level or above.
• At least 20 credits of the required 60 credits must be at the 200 level or higher.

General Studies Emphasis

1. Oral Communication Skills*

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<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tr>
<td>COMM A111</td>
<td>Fundamentals of Oral Communication</td>
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<tr>
<td>COMM A235</td>
<td>Small Group Communication</td>
<td>3</td>
</tr>
<tr>
<td>COMM A237</td>
<td>Interpersonal Communication</td>
<td>3</td>
</tr>
<tr>
<td>COMM A241</td>
<td>Public Speaking</td>
<td>3</td>
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</table>

*Note: At least 20 credits at the 200 level or above are required for the AA degree. Taking a 200-level Oral Communications course.
course will enable students to complete that requirement more quickly.

2. Written Communication Skills 6

ENGL A111 Methods of Written Communication (3)
and one of the following:
CIOS A260A* Business Communications (3)
ENGL A211 Academic Writing About Literature (3)
ENGL A212 Technical Writing (3)
ENGL A213 Writing in the Social and Natural Sciences (3)
ENGL A214 Persuasive Writing (3)

3. Humanities and Fine Arts 9

Three courses from the GER Classification List.
At least one course each from the Humanities and Fine Arts areas.

4. Mathematical and Natural Sciences 9

MATH A105* Intermediate Algebra (3)
or
One course from the Quantitative Skills area of the GER Classification List (3)
and
Two courses from the Natural Science area of the GER Classification List (6)**

5. Social Sciences 6

Two courses (from two different disciplines) from the Social Sciences area of GER Classification List

6. Electives 27

Total minimum credits 60

* Note: CIOS A260A and MATH A105 do not meet the General Education Requirements for the baccalaureate degree.

** Note: Students who have taken two Natural Science courses as part of their AA program should be aware that a 1-credit science laboratory is required for the baccalaureate degree.

Fine Arts, Humanities, Natural Sciences and Social Sciences Emphases

1. Oral Communication Skills 3

COMM A111 Fundamentals of Oral Communication (3)
COMM A235 Small Group Communication (3)
COMM A237 Interpersonal Communication (3)
COMM A241 Public Speaking (3)

*Note: At least 20 credits at the 200 level or above are required for the AA degree. Taking a 200-level Oral Communications course will enable students to complete that requirement more quickly.

2. Written Communication Skills 6

ENGL A111 Methods of Written Communication (3)
and one of the following:
ENGL A211 Academic Writing About Literature (3)
ENGL A212 Technical Writing (3)
ENGL A213 Writing in the Social and Natural Sciences (3)
ENGL A214 Persuasive Writing (3)

3. Quantitative Skills 3-6

MATH A105* Intermediate Algebra (3)
MATH A107 College Algebra (4)
MATH A108 Trigonometry (3)
MATH A109 Precalculus (6)
MATH A172 Applied Finite Mathematics (3)
STAT A252 Elementary Statistics (3)

*Note: MATH A105 does not satisfy the General Education Requirement in Quantitative Skills for a baccalaureate degree.

MATH A107, A108 or A109 are recommended for students planning to pursue baccalaureate studies in the natural or social sciences.

4. Fine Arts 3

AKNS/
MUS A215* Music of Alaska Natives and Indigenous Peoples of Northern Regions (3)
ART A160 Art Appreciation (3)
ART A261 History of Western Art I (3)
ART A262 History of Western Art II (3)
DNCE A170 Dance Appreciation (3)
MUS A121* Music Appreciation* (3)
MUS A124* History of Jazz (3)
MUS A221* History of Music I (3)
MUS A222* History of Music II (3)
THR A111 Introduction to the Theatre (3)

* Note: Students majoring in Music must select courses outside their major.

Advising Note for AA Students Who Plan to Pursue a Baccalaureate Degree

AA students who plan to pursue a baccalaureate degree must take care in planning their curriculum. Students who know the program or major they are going to transfer into should consult the General Education Requirements for their specific program or major. Programs often require specific GER courses for their majors. The AA emphases in Fine Arts, Humanities, Natural Sciences, and Social Sciences are designed to prepare students to go on to baccalaureate work in related disciplines.
Additional Requirements for Fine Arts Emphasis

5. Cultural Heritages and Social Sciences 15

ANTH A250  The Rise of Civilization (3)
and the following:
HIST A101  Western Civilization I (3)
HIST A102  Western Civilization II (3)
and one of the following:
HIST A131  History of the United States I (3)
HIST A132  History of the United States II (3)
PS A101  Introduction to American Government (3)
and one of the following:
ECON A201  Principles of Macroeconomics (3)
JPC A101  Media and Society (3)
PS A102  Introduction to Political Science (3)
PSY A111  General Psychology (3)
SOC A101  Introduction to Sociology (3)
SWK A243  Cultural Diversity and Community Service Learning (3)

6. Languages/Humanities 6-8
Complete any two-semester sequence in one of the following humanities sequences or in a language other than English (with same letter suffix):
ART A261  History of Western Art I (3)
ART A262  History of Western Art II (3)
ENGL A201  Masterpieces of World Literature I (3)
ENGL A202  Masterpieces of World Literature II (3)
MUS A221*  History of Music I (3)
MUS A222*  History of Music II (3)
PHIL A211  History of Philosophy I (3)
PHIL A212  History of Philosophy II (3)
* Note: Students majoring in Music must select courses outside their major.

7. Natural Sciences 7
Complete two courses from the Natural Sciences area of the GER Classification List, including a laboratory course.

8. Ways of Knowing 3
ENGL A120  Critical Thinking (3)
PHIL A101  Introduction to Logic (3)
PHIL A201  Introduction to Philosophy (3)

9. An additional 9-14 credits from courses other than those used for degree requirements above. A minimum of 20 credits at the 200 level or above are required for the degree. Recommendations include any of the Fine Arts courses listed above as well as:
ART A105  Beginning Drawing (3)
ART A111  Two-Dimensional Design (3)
ART A113  Three-Dimensional Design (3)
ART A203  Introduction to Art Education (3)
ART A204  History and Philosophy of Art Education (3)
ART A205  Intermediate Drawing (3)
DNCE A262  Theory and Improvisation (2)
MUS A111*  Fundamentals of Music (3)
MUS A131*  Music Theory I (3)
MUS A132*  Music Theory II (3)
MUS A133*  Aural Skills I (2)
MUS A134*  Aural Skills II (2)
MUS A154D*  Functional Piano IV (1)
MUS A161, A162, A261, A262  Private Lessons* (4)
MUS A231*  Music Theory III (3)
MUS A232*  Music Theory IV (3)
MUS A233*  Aural Skills III (2)
MUS A234*  Aural Skills IV (2)
MUS A280*  Basic Conducting (2)
THR A121  Introduction to Acting (3)
THR A131  Theatrical Production Techniques (3)
THR A141  Stagecraft I (3)
THR A221  Movement for the Actor (3)
THR A222  Voice for the Actor (3)
THR A243  Scene Design (3)
THR A257  Costume design and Construction I (3)
THR A295  Theatre Practicum: Technical (1-3)
Or other courses, with department approval, from the following disciplines: Art, Dance, Music, Theatre.

Total minimum credits 60

Additional Requirements for Humanities Emphasis

5. Cultural Heritages and Social Sciences 15

ANTH A250  The Rise of Civilization (3)
and the following:
HIST A101  Western Civilization I (3)
HIST A102  Western Civilization II (3)
and one of the following:
HIST A131  History of the United States I (3)
HIST A132  History of the United States II (3)
PS A101  Introduction to American Government (3)
and one of the following:
ECON A201  Principles of Macroeconomics (3)
JPC A101  Media and Society (3)
PS A102  Introduction to Political Science (3)
PSY A111  General Psychology (3)
SOC A101  Introduction to Sociology (3)
SWK A243  Cultural Diversity and Community Service Learning (3)

Total minimum credits 60
6. **Languages/Humanities** 6-8
   Complete any two-semester sequence in one of the following humanities sequences or in a language other than English (with same letter suffix):
   - ART A261  History of Western Art I (3)
   - ART A262  History of Western Art II (3)
   - ENGL A201  Masterpieces of World Literature I (3)
   - ENGL A202  Masterpieces of World Literature II (3)
   - MUS A221*  History of Music I (3)
   - MUS A222*  History of Music II (3)
   - PHIL A211  History of Philosophy I (3)
   - PHIL A212  History of Philosophy II (3)
   *Note: Students majoring in Music must select courses outside their major.

7. **Social Sciences**
   - ANTH A202  Cultural Anthropology (3)
   - ANTH A205  Biological Anthropology (3)
   - ANTH A211  Fundamentals of Archaeology (3)
   - ANTH A250  The Rise of Civilization (3)
   - ENVI A212  Living on Earth: People and the Environment (3)

8. **Natural Sciences*** 25-30
   Complete 25-30 credits from courses other than those used for degree requirements above. A minimum of 20 credits at the 200 level or above are required for the degree. Recommended courses include:
   - BIOL A242  Fundamentals of Cell Biology (4)
   - BIOL A252  Principles of Genetics (4)
   - BIOL A271  Principles of Ecology (4)
   - CHEM A253  Principles of Inorganic Chemistry (3)
   - CHEM A253/L  Environmental Science: Systems and Processes (4)

   Other courses, with department approval, from the following disciplines: Astronomy, Biology, Chemistry, Environmental Studies, Geography, Geology, Liberal Studies Integrated Sciences, Physics.
   *Note: Students majoring in Biological Science, Geology, or Natural Sciences must take CHEM A105/L, CHEM A106/L, PHYS A123/L, and PHYS A124/L. Therefore, it is highly advisable that students consider taking these courses. In addition to those aforementioned courses, all Biological Science majors must also take BIOL A115 and BIOL A116 and all Geological Science majors must take GEOL A111 and GEOL A221 prior to advancing on to higher level courses.

9. **Natural Sciences** 7
   Complete two courses from the Natural Sciences area of the GER Classification List, including a laboratory course.

10. **Ways of Knowing** 3
    - ENGL A120  Critical Thinking (3)
    - PHIL A101  Introduction to Logic (3)
    - PHIL A201  Introduction to Philosophy (3)

11. **Additional Requirements for Natural Science Emphasis**
    - CS A109  Computer Programming (Languages Vary) (3)
    - CS A110  Java Programming (3)
    - CS A111  Visual Basic .NET Programming (3)

12. **Languages/Humanities** 6-8
    Complete any two-semester sequence in French, German, Japanese, Russian, or Spanish, or one of the following humanities sequences not used to satisfy the Fine Arts requirement:
    - ART A261  History of Western Art I (3)
    - ART A262  History of Western Art II (3)
    - ENGL A201  Masterpieces of World Literature I (3)
    - ENGL A202  Masterpieces of World Literature II (3)

Total minimum credits: 60
**Additional Requirements for Social Science Emphasis**

5. **Language/Humanities** 6-8
   - Complete any two-semester sequence in French, German, Japanese, Russian, or Spanish, or one of the following Humanities sequences not used to satisfy the Fine Arts requirement:
     - ART A261 History of Western Art I (3)
     - ART A262 History of Western Art II (3)
     - ENGL A201 Masterpieces of World Literature I (3)
     - ENGL A202 Masterpieces of World Literature II (3)
     - MUS A221 History of Music I (3)
     - MUS A222 History of Music II (3)
     - PHIL A211 History of Philosophy I (3)
     - PHIL A212 History of Philosophy II (3)
   *Note: Students majoring in Music must select courses outside their major.*

6. **Computer Science/Cultural Heritages** 3
   - Students planning to go on for a BS should take one of the following Computer Science courses (3):
     - CS A109 Computer Programming (Languages Vary) (3)
     - CS A110 Java Programming (3)
     - CS A111 Visual Basic .NET Programming (3)
   - Students planning to go on for a BA should take one of the Cultural Heritages courses* (3):
     - ANTH A250 The Rise of Civilization (3)
     - HIST A101 Western Civilization I (3)
     - HIST A102 Western Civilization II (3)
     - HIST A131 History of the United States I (3)
     - HIST A132 History of the United States II (3)
     - PS A101 Introduction to American Government (3)
   *Note: At least 20 credits at the 200-level or above are required for the AA degree. Taking a 200-level Cultural Heritages course will enable students to complete that requirement more quickly*

7. **Natural Sciences** 7
   - Complete two courses (including a lab) from the following list:
     - ASTR A103/L Solar System Astronomy (3)
     - ASTR A104/L Solar System Astronomy Lab (1)
     - BIOL A102 Introductory Biology (3)
     - BIOL A103 Introductory Biology Laboratory (1)
     - BIOL A111 Human Anatomy and Physiology I (4)
     - BIOL A112 Human Anatomy and Physiology II (4)
     - BIOL A115 Fundamentals of Biology I (4)
     - BIOL A116 Fundamentals of Biology II (4)
     - CHEM A103/L Survey of Chemistry (4)
     - CHEM A104/L Introduction to Organic Chemistry
     - CHEM A105/L General Chemistry I (4)
     - CHEM A106/L General Chemistry II (4)
     - ENVI A211/L Environmental Science: Systems and Processes (4)
     - GEOG A111 Earth Systems: Elements of Physical Geography (3)
     - GEOL A111 Physical Geology (4)
     - GEOL A115/L Environmental Geology (4)
     - GEOL A221 Historical Geology (4)
     - PHYS A123/L Basic Physics I (4)
     - PHYS A124/L Basic Physics II (4)

8. **Social Sciences** 24-29
   - Complete 24-29 credits from courses other than those used for other degree requirements above. A minimum of 20 credits at the 200 level and above are required for the degree.
   - Recommended courses include:
     - ANTH A202 Cultural Anthropology (3)
     - ANTH A205 Biological Anthropology (3)
     - ANTH A211 Fundamentals of Archaeology (3)
     - ENVI A212 Living on Earth: People and the Environment (3)
     - GEOG / INTL A101 Local Places/Global Regions: An Introduction to Geography (3)
     - JUST/ SOC A251 Crime and Delinquency (3)
     - PS A102 Introduction to Political Science (3)
     - PSY A111 General Psychology (3)
     - PSY A260/L Statistics for Psychology (4)
     - SOC A101 Introduction to Sociology (3)
   - Other courses, with department approval, from the following disciplines: Anthropology, Environmental Sciences, Geography, Political Science, Psychology, Sociology.
   - **Total minimum credits:** 60
**Associate Degrees**
The University of Alaska Anchorage offers two types of associate degrees, both of which require the completion of 60 credits or more:

- **The Associate of Arts (AA) degree** combines broad studies in written communication, oral communication, humanities, mathematics, natural sciences and social sciences, with elective coursework selected by the student. The degree provides broad exposure to systems of thought and inquiry, allows exploration of a variety of disciplines and learning experiences, and provides a solid foundation for further study at the baccalaureate level. The AA degree offers a General Studies emphasis and emphases in Fine Arts, Humanities, Natural Sciences, and Social Sciences. The AA degree is administered by the College of Arts and Sciences (CAS). The complete program description is found under the CAS section of this chapter.

- **The Associate of Applied Science (AAS) degree** provides applied or specialized studies that are used to satisfy a student’s specific educational needs. Many AAS programs prepare students for work in a particular field of employment. Some AAS degrees are designed to provide a foundation for a specific related baccalaureate degree. Students in AAS degree programs build knowledge and skills needed to carry out specific tasks while they develop abilities in the essential elements of communications, computation and human relations.

**ASSOCIATE OF ARTS**
The Associate of Arts (AA) degree provides a solid foundation in mathematics, written and oral communication, the natural and social sciences, the humanities, and fine arts. The AA degree prepares students for career advancement and baccalaureate programs and to better understand their world. The AA offers a General Studies emphasis and, for students planning to pursue a baccalaureate degree, emphases in Fine Arts, Humanities, Natural Sciences, and Social Sciences.

**Student Learning Outcomes**
Students graduating with an AA degree from UAA will be able to:

- Communicate effectively with diverse audiences (individual, group, or public) using a variety of verbal and nonverbal communication strategies;
- Respond effectively to writing assignments using appropriate genres and standard written English;
- Use library and electronic research responsibly and appropriately;
- Identify, describe, and evaluate the aesthetic, historical and philosophical aspects of material culture, including artistic expressions, language, and texts;
- Apply critical thinking skills to identify the premises and conclusions of arguments, evaluate their soundness, and recognize common fallacies;
- Use appropriate mathematical language and symbols to develop and communicate solutions and demonstrate quantitative and analytical skills and knowledge;
- Articulate the fundamentals, developments, and impacts of one or more scientific disciplines and develop and analyze evidence-based conclusions about the natural and social world.

**Admission Requirements**
Complete the Undergraduate Certificate and Associate Degree Program Admission Requirements located at the beginning of Chapter 7, Academic Standards and Regulations.

**General University Requirements**
Complete General University Requirements for the Associate of Arts located at the beginning of this chapter.

**Degree Requirements**
All courses must be at the 100 level or above. At least 30 credits of the required 60 credits must be at the 100 level. Students intending to complete the AA degree and then continue on to a baccalaureate degree should consult the Advising Note for AA Students Who Plan to Pursue a Baccalaureate Degree below.

- **This degree requires a minimum of 60 credits.**
- **Students must complete at least 15 credits in residence.**
- **Students must earn a cumulative GPA of at least a 2.00 at UAA.**
- **All courses must be at the 100 level or above.**
- **At least 20 credits of the required 60 credits must be at the 200 level or higher.**

**General Studies Emphasis**
Course Requirements
2. Oral Communication Skills*  3
COMM A111  Fundamentals of Oral Communication (3)
COMM A235  Small Group Communication (3)
COMM A237  Interpersonal Communication (3)
COMM A241  Public Speaking (3)
*Note: At least 20 credits at the 200 level or above are required for the AA degree. Taking a 200-level Oral Communications course will enable students to complete that requirement more quickly.

2. Written Communication Skills  6
ENGL A111  Methods of Written Communication (3)
and one of the following:
CIOS A260A*  Business Communications (3)
ENGL A211  Academic Writing About Literature (3)
ENGL A212  Technical Writing (3)
ENGL A213  Writing in the Social and Natural Sciences (3)
ENGL A214  Persuasive Writing (3)

3. Humanities and Fine Arts  9
Three courses from the GER Classification List. At least one course each from the Humanities and Fine Arts areas.

4. Mathematical and Natural Sciences  9
MATH A105*  Intermediate Algebra (3)  
or one course from the Quantitative Skills area of the GER Classification List (3)
and Two Natural Science courses from the Natural Science area of the GER Classification List (3+3)**

5. Social Sciences  6
Two Social Science courses (from two different disciplines) from the Social Sciences area of GER Classification List

Degree Completion Requirements
6. Electives  27
Total minimum credits  60
* Please note: CIOS A260A and MATH A105 do not meet the General Education Requirements for the baccalaureate degree.
** Note: Students who have taken two Natural Science courses as part of their AA program should be aware that a 1-credit science laboratory is required for the baccalaureate degree.

Advising Note for AA Students Who Plan to Pursue a Baccalaureate Degree
AA students who plan to pursue a baccalaureate degree must take care in planning their curriculum. Please see an advisor and take note of the following: Students who know the program or major they are going to transfer into should consult the General Education Requirements for their specific program or major. Programs often require specific GER courses for their majors. The AA Emphases in Fine Arts, Humanities, Natural Sciences, and Social Sciences are designed to prepare students to go on to a baccalaureate work in related disciplines.

• UAA baccalaureate students are required to complete 12 credits of basic college level skills from the Oral Communication, Written Communication, and Quantitative Skills areas of the General Education Classification List prior to completing 60 total degree-applicable credits.
• Students with 60 credits or more who have not completed the baccalaureate 12-credit basic college level skills requirement will have one full academic year to fulfill this requirement, after which they will not be allowed to take additional courses as degree-seeking students. MATH A105 and CIOS A260A do not count toward completing the baccalaureate GER requirements.
• Students who have taken two Natural Science courses as part of their AA program should be aware that a 1-credit science laboratory is required for the baccalaureate degree.

• Students who plan to apply AA credits to a UAA baccalaureate degree, and who know the program or major they are going to transfer into, should consult the General Education Requirements for their specific program or major. Programs often require specific GER courses for their majors.

• Students planning to transfer should line AA electives to fulfill prerequisites and requirements for their anticipated major.

• Students who plan to apply AA credits to a UAA baccalaureate degree, and who do not know which program or major they wish to pursue, should plan as follows:

Fine Arts, Humanities, Natural Sciences and Social Sciences Emphases
1. Oral Communication Skills  3
COMM A111  Fundamentals of Oral Communication (3)
COMM A235  Small Group Communication (3)
COMM A237  Interpersonal Communication (3)
COMM A241  Public Speaking (3)
*Note: At least 20 credits at the 200 level or above are required
for the AA degree. Taking a 200-level Oral Communications course will enable students to complete that requirement more quickly.

2. Written Communication Skills 6
ENGL A111 Methods of Written Communication (3) and one of the following:
ENGL A211 Academic Writing about Literature (3)
ENGL A212 Technical Writing (3)
ENGL A213 Writing in the Social and Natural Sciences (3)
ENGL A214 Persuasive Writing (3)

3. Quantitative Skills 3-6
MATH A105* Intermediate Algebra (3)
MATH A107 College Algebra (4)
MATH A108 Trigonometry (3)
MATH A109 Precalculus (6)
MATH A172 Applied Finite Mathematics (3)
*Note: MATH A105 does not satisfy the General Education Requirement in Quantitative Skills for a baccalaureate degree.
MATH A107, A108 and A109 are recommended for students planning to pursue baccalaureate studies in the natural or social sciences.

4. Fine Arts 3
AKNS/MUS A215* Music of Alaska Natives and Indigenous Peoples of Northern Regions (3)
ART A160 Art Appreciation (3)
ART A261 History of Western Art I (3)
ART A262 History of Western Art II (3)
DANCE A170 Dance Appreciation (3)
MUS A121* Music Appreciation* (3)
MUS A124* History of Jazz (3)
MUS A211* History of Music I (3)
MUS A222* History of Music II (3)
THR A111 Introduction to the Theatre (3)
* Note: Students majoring in Music must select courses outside their major.

5. Cultural Heritages and Social Sciences 15
ANTH A250 The Rise of Civilization (3) and one of the following:
HIST A101 Western Civilization I (3)
HIST A102 Western Civilization II (3) and one of the following:
HIST A131 History of the United States I (3)
HIST A132 History of the United States II (3)

PS A101 Introduction to American Government (3) and one of the following:
ECON A201 Principles of Macroeconomics (3)
IPC A101 Media and Society (3)
PS A102 Introduction to Political Science (3)
PSY A111 General Psychology (3)
SOC A101 Introduction to Sociology (3)
SWK A243 Cultural Diversity and Community Service Learning (3)

6. Languages/Humanities 6-8
Complete any two-semester sequence in one of the following humanities sequences or in a language other than English (with same letter suffix):
ART A261 History of Western Art I (3)
ART A262 History of Western Art II (3)
ENGL A201 Masterpieces of World Literature I (3)
ENGL A202 Masterpieces of World Literature II (3)
MUS A221* History of Music I (3)
MUS A222* History of Music II (3)
PHIL A211 History of Philosophy I (3)
PHIL A212 History of Philosophy II (3)
* Note: Students majoring in Music must select courses outside their major.

7. Natural Sciences 7
Complete two courses from the Natural Sciences area of the GER Classification List, including a laboratory course.

8. Ways of Knowing 3
ENGL A120 Critical Thinking (3)
PHIL A101 Introduction to Logic (3)
PHIL A201 Introduction to Philosophy (3)

9. Additional Requirements for Fine Arts Emphasis 33
Complete any two courses from the Natural Sciences area of the GER Classification List, including a laboratory course.

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10. An additional 9-14 credits from courses other than those used for degree requirements above. A minimum of 20 credits at the 200 level or above are required for the degree. Recommendations include any of the Fine Arts courses listed above as well as:
ART A105 Beginning Drawing (3)
ART A111 Two-Dimensional Design (3)
ART A113 Three-Dimensional Design (3)
ART A203 Introduction to Art Education (3)
ART A204 History and Philosophy of Art Education (3)
ART A205 Intermediate Drawing (3)
DANCE A262 Theory and Improvisation (2)
MUS A111* Fundamentals of Music (3)
MUS A131* Music Theory I (3)
MUS A132* Music Theory II (3)
MUS A133* Aural Skills I (2)
MUS A134* Aural Skills II (2)
MUS A154D* Functional Piano IV (1)
MUS A161, A162, A261, A262 Private Lessons* (4)
MUS A231* Music Theory III (3)
MUS A232* Music Theory IV (3)
MUS A233* Aural Skills II (2)
MUS A234* Aural Skills IV (2)
MUS A280* Basic Conducting (2)
THR A121 Introduction to Acting (3)
THR A131 Theatrical Production Techniques (3)
THR A141 Stagecraft I (3)
THR A221 Movement for the Actor (3)
THR A222 Voice for the Actor (3)
THR A243 Scene Design (3)
THR A295 Theatre Practicum: Technical (1-3)
Or other courses, with department approval, from
the following disciplines: Art, Dance, Music, Theatre.
* Note: Students majoring in Music must select courses outside
their major.
Total minimum credits 60

Additional Requirements for Humanities Emphasis
5. Cultural Heritages and Social Sciences 15
ANTH A250 The Rise of Civilization (3)
and the following:
HIST A101 Western Civilization I (3)
HIST A102 Western Civilization II (3)
and one of the following:
HIST A131 History of the United States I (3)
HIST A132 History of the United States II (3)
PS A101 Introduction to American Government (3)
and one of the following:
ECON A201 Principles of Macroeconomics (3)
IPC A101 Media and Society (3)
PS A102 Introduction to Political Science (3)
PSY A111 General Psychology (3)
SOC A101 Introduction to Sociology (3)
SWK A243 Cultural Diversity and Community
Service Learning (3)
6. Languages/Humanities 6-8
Complete any two-semester sequence in one of the following
humanities sequences or in a language other than
English (with same letter suffix):
ART A261 History of Western Art I (3)
ART A262 History of Western Art II (3)
ENGL A201 Masterpieces of World Literature I (2)
ENGL A202 Masterpieces of World Literature II (2)
MUS A221* History of Music I (3)
MUS A222* History of Music II (3)
PHIL A211 History of Philosophy I (3)
PHIL A212 History of Philosophy II (3)
* Note: Students majoring in Music must select courses outside
their major.
7. Social Sciences 6
Complete two courses from the following:
ANTH A202 Cultural Anthropology (3)
ANTH A205 Biological Anthropology (3)
ANTH A211 Fundamentals of Archaeology (3)

Additional Requirements for Natural Science Emphasis
5. Computer Science 3
CS A109 Computer Programming (Languages Vary) (3)
CS A110 Java Programming (3)
CS A111 Visual Basic .NET Programming (3)
6. Languages/Humanities 6-8
Complete any two-semester sequence in French, German,
Japanese, Russian, or Spanish, or one of the following
humanities sequences not used to satisfy the Fine Arts
requirement:
ART A261 History of Western Art I (3)
ART A262 History of Western Art II (3)
ENGL A201 Masterpieces of World Literature I (3)
ENGL A202 Masterpieces of World Literature II (3)
MUS A221* History of Music I (3)
MUS A222* History of Music II (3)
PHIL A211 History of Philosophy I (3)
PHIL A212 History of Philosophy II (3)
* Note: Students majoring in Music must select courses outside
their major.
ANTH A250  The Rise of Civilization (3)
ENVI A212  Living on Earth: People and the
Environment (3)
GEOG/INTL A101  Local Places/Global Regions: An
Introduction to Geography (3)
JUST/SOC A251  Crime and Delinquency (3)
PS A101  Introduction to American Government (3)
PS A102  Introduction to Political Science (3)
PSY A111  General Psychology (3)
PSY A260/L  Statistics for Psychology (4)
SOC A101  Introduction to Sociology (3)

8. Natural Sciences*  25-30
Complete 25-30 credits from courses other than those used for
degree requirements above. A minimum of 20 credits at the
200 level or above are required for the degree. Recommended
courses include:
BIOL A242  Fundamentals of Cell Biology (4)
BIOL A252  Principles of Genetics (4)
BIOL A271  Principles of Ecology (4)
CHEM A253  Principles of Inorganic Chemistry (3)
ENVI A211/L  Environmental Science: Systems and
Processes (4)
Other courses, with department approval, from the
following disciplines: Astronomy, Biology, Chemistry,
Environmental Studies, Geology, Liberal Studies, Integrated Sciences, Physics.
* Note: Students majoring in Biological Science, Geology, or
Natural Sciences must take CHEM A105/L, CHEM A106/L, PHYS
A123/L, and PHYS A124/L. Therefore, it is highly advisable that
students consider taking these courses. In addition to these
recommended courses, all Biological Science majors must also take
BIOL A115 and BIOL A116 and all Geology Science majors must
take GEOL A111 and GEOL A221 prior to advancing on to higher
level courses.
Total minimum credits: 60

6. Computer Science/Cultural Heritages  3
Students planning to go on for a BS should take one of the
following Computer Science courses (3):
CS A109  Computer Programming (Languages Vary) (3)
CS A110  Java Programming (3)
CS A111  Visual Basic .NET Programming (3)
Students planning to go on for a BA should take one of the
Cultural Heritages courses* (3):  
ANTH A250  The Rise of Civilization (3)

HIST A101  Western Civilization I (3)
HIST A102  Western Civilization II (3)
HIST A131  History of the United States I (3)
HIST A132  History of the United States II (3)
PS A101  Introduction to American Government (3)
*Note: At least 20 credits at the 200-level or above are required for
the AA degree. Taking a 200-level Cultural Heritages course will
enable students to complete that requirement more quickly

7. Natural Sciences  7
Complete two courses (including a lab) from the following
list:
ASTR A103/L  Solar System Astronomy (3)
ASTR A104/L  Solar System Astronomy Lab (1)
BIOL A102  Introductory Biology (3)
BIOL A103  Introductory Biology Laboratory (1)
BIOL A111  Human Anatomy and Physiology I (4)
BIOL A112  Human Anatomy and Physiology II (4)
BIOL A135  Fundamentals of Biology I (4)
BIOL A136  Fundamentals of Biology II (4)
CHEM A103/L  Survey of Chemistry (4)
CHEM A104/L  Introduction to Organic Chemistry
and Biochemistry (4)
CHEM A105/L  General Chemistry I (4)
CHEM A106/L  General Chemistry II (4)
ENVI A211/L  Environmental Science: Systems and
Processes (4)
GEOL A111  Earth Systems: Elements of Physical
Geography (3)
GEOL A111  Physical Geology (4)
GEOL A115/L  Environmental Geology (4)
GEOL A221  Historical Geology (4)
PHYS A123/L  Basic Physics I (4)
PHYS A124/L  Basic Physics II (4)

5. Language/Humanities  6-8
Complete any two-semester sequence in French, German,
Japanese, Russian, or Spanish, or one of the following
Humanities sequences not used to satisfy the Fine Arts
requirement:
ART A261  History of Western Art I (3)
ART A262  History of Western Art II (3)
ENGL A201  Masterpieces of World Literature I (3)
ENGL A202  Masterpieces of World Literature II (3)
MUS A221*  History of Music I (3)
MUS A222*  History of Music II (3)
PHIL A211  History of Philosophy I (3)
PHIL A212  History of Philosophy II (3)
* Note: Students majoring in Music must select courses outside
their major.

7. Natural Sciences  7
Social Sciences 24-29

Complete 24-29 credits from courses other than those used for other degree requirements above. A minimum of 20 credits at the 200 level and above are required for the degree. Recommended courses include:

- ANTH A202: Cultural Anthropology (3)
- ANTH A205: Biological Anthropology (3)
- ANTH A211: Fundamentals of Archaeology (3)
- ENVI A212: Living on Earth: People and the Environment (3)
- GEOG/INTL A101: Local Places/Global Regions: An Introduction to Geography (3)
- JUST/SOC A251: Crime and Delinquency (3)
- PS A102: Introduction to Political Science (3)
- PSY A111: General Psychology (3)
- PSY A260/L: Statistics for Psychology (4)
- SOC A101: Introduction to Sociology (3)

Other courses, with department approval, from the following disciplines: Anthropology, Environmental Sciences, Geography, Political Science, Psychology, Sociology.

Total minimum credits: 60
Memo regarding: Computer Science and Computer Systems Engineering Curriculum
From: Kenrick Mock, Chair, Dept. of Computer Science & Engineering

Curriculum Committees:

Effective July 1, 2012 the primary faculty supporting the Computer Science program and the Computer Systems Engineering program merged into a single department in the School of Engineering, the Department of Computer Science & Engineering. As a result of the merger we have modified the curriculum in the following ways:

1. Merged courses from separate programs with similar coverage into single courses supporting both programs.
2. Updated curriculum so students learn both Java and C++ early in the curriculum so they can more easily take upper division courses that were previously designated CSE (requiring C++) or upper division courses previously designated CS (requiring Java).
3. Updated the curriculum and existing courses to better meet industry, ABET, and student outcomes while helping students to more easily graduate.
4. Added new courses reflecting faculty expertise, industry and student demand, and trends in the discipline.
5. Stacked courses with graduate electives in advance of a proposed MS degree in computing.

We have designed the curriculum with a new prefix, CSCE, that is common to all courses required for the CS or CSE degrees. The new prefix reinforces to both CS and CSE students that they will be able to and should consider taking courses that were once labeled CS or CSE. CS and CSE support courses have been left with the CS and CSE prefixes so other programs do not need to change their program descriptions or websites.

We have analyzed the new curriculum and have a plan to offer a majority of required core lower division courses every semester and upper division core courses at least once a year. Electives are offered yearly or once every other year.

The largest individual course change is to move the first two introductory programming courses to 4 credit courses from 3 credits. The change to 4 credits allows us to add a one credit laboratory component. The lecture portion will become larger than current sections but we believe the addition of the hands-on lab component with the ability for an instructor to interact 1:1 with a student and their code will ultimately increase student success and retention.

Sincerely,

Kenrick Mock
2/14/13
Memo regarding: Computer Science and Computer Systems Engineering Curriculum
From: Kenrick Mock, Chair, Dept. of Computer Science & Engineering

Members of the UAB:

We respectfully request that the board consider waiving the first reading of the CSCE courses at the 2/22/13 meeting. If the courses are approved this will allow them to be offered in fall 2013. It is our understanding that the faculty senate meeting on 3/1/13 is the final opportunity to have courses approved in time for the fall semester student enrollment which typically begins at the end of March.

Sincerely,

Kenrick Mock
1a. School or College
   EN SOENGR
1b. Department
   Computer Science & Engineering

2. Complete Program Title/Prefix
   CSCE / Bachelor of Arts and Bachelor of Science, Computer Science; Bachelor of Science in Engineering, Computer Systems Engineering

3. Type of Program
   Choose one from the appropriate drop down menu:
   Undergraduate: or Graduate:
   Choose ONE

   This program is a Gainful Employment Program:
   □ Yes or □ No

4. Type of Action:
   PROGRAM
   □ Add
   □ Change
   □ Delete
   PREFIX
   ☑ Add
   □ Change
   □ Inactivate

5. Implementation Date (semester/year)
   From: Fall/2013 To: 99/9999

6a. Coordination with Affected Units
   Department, School, or College: SOE
   Initiator Name (typed): Kenrick Mock
   Initiator Signed Initials: ____________
   Date: __________________

6b. Coordination Email submitted to Faculty Listserv (uaa-faculty@lists.uaa.alaska.edu)
   Date: 12-10-12

6c. Coordination with Library Liaison
   Date: 12-10-12

7. Title and Program Description - Please attach the following:
   ☑ Cover Memo
   □ Catalog Copy in Word using the track changes function

8. Justification for Action
   New prefix of CSCE requested for core courses in the CS and CSE degree programs.

Initiator (faculty only) Date
Kenrick Mock Date

☐ Approved Dean/Director of School/College Date
☐ Disapproved

Department Chair Date

☐ Approved Undergraduate/Graduate Academic Date
☐ Disapproved Board Chair Date

College/School Curriculum Committee Chair Date

☐ Approved Provost or Designee Date
☐ Disapproved
### Course Action Request

**University of Alaska Anchorage**  
Proposal to Initiate, Add, Change, or Delete a Course

<table>
<thead>
<tr>
<th>1a. School or College</th>
<th>1b. Division</th>
<th>1c. Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN SOENGR</td>
<td>No Division Code</td>
<td>Computer Science and Engineering</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Course Prefix</th>
<th>3. Course Number</th>
<th>4. Previous Course Prefix &amp; Number</th>
<th>5a. Credits/CEUs</th>
<th>5b. Contact Hours</th>
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</thead>
<tbody>
<tr>
<td>CSCE</td>
<td>A320</td>
<td>CSE A335</td>
<td>3</td>
<td>(Lecture + Lab) (3+0)</td>
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</thead>
<tbody>
<tr>
<td>Operating Systems</td>
<td>Academic</td>
<td>Add or Change</td>
<td># of Repeats  n/a</td>
<td>A-F (option)</td>
<td>From: Fall/2013 To: 99/9999</td>
<td>Stack with</td>
</tr>
</tbody>
</table>

#### 13a. Impacted Courses or Programs

List any programs or college requirements that require this course.

**Impacted Programs Courses**

<table>
<thead>
<tr>
<th>Catalog Page(s) Impacted</th>
<th>Date of Coordination</th>
<th>Chair/Coordinator Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. BA Computer Science (required)</td>
<td>241</td>
<td>12/1/12</td>
</tr>
<tr>
<td>2. BSE Computer Science (required)</td>
<td>242</td>
<td>12/1/12</td>
</tr>
<tr>
<td>3. CSE A465, Network Security</td>
<td>382</td>
<td>12/1/12</td>
</tr>
</tbody>
</table>

Initiator Name (typed): Sam Siewert  
Initiator Signed Initials: ___________  
Date: ___________

#### 14. General Education Requirement

Mark appropriate box:

- Oral Communication
- Written Communication
- Quantitative Skills
- Social Sciences
- Natural Sciences
- Integrative Capstone

#### 15. Course Description

An introductory course on operating systems. Topics covered include all aspects of resource management and abstraction required to support application programs including: basic security, processes and threads, processor scheduling, synchronization, memory management, virtual memory, virtual machines, device drivers and Input/Output (I/O), and file systems.

#### 16a. Course Prerequisite(s) (list prefix and number)

CSCE A311 with minimum grade of C.

#### 16b. Test Score(s)

n/a

#### 16c. Co-requisite(s) (concurrent enrollment required)

n/a

#### 16d. Other Restriction(s)

- College
- Major
- Class
- Level

16e. Registration Restriction(s) (non-codable)

n/a

17. Mark if course has fees Yes, standard SOE fee

18. Mark if course is a selected topic course

#### 19. Justification for Action

Revision to establish a course common to both the Computer Science and Computer Systems Engineering programs and update the course content guide.

Initiator Name: Sam Siewert  
Initiator (faculty only): ___________  
Date: ___________

<table>
<thead>
<tr>
<th>Approved</th>
<th>Disapproved</th>
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<tbody>
<tr>
<td>Dean/Director of School/College</td>
<td>Date</td>
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<tbody>
<tr>
<td>Undergraduate/Graduate Academic Board Chairperson</td>
<td>Date</td>
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<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Provost or Designee</td>
<td>Date</td>
</tr>
</tbody>
</table>

40
I. Initiation Date: December 2012

II. Course Information
A. College/School: School of Engineering
B. Course Title: Operating Systems
C. Course Subject/Number: CSCE A320
D. Credit Hours: 3.0 Credits
E. Contact Time: 3+0 Contact Time
F. Grading Information: A-F
G. Course Description: An introductory course on operating systems. Topics covered include all aspects of resource management and abstraction required to support application programs including: basic security, processes and threads, processor scheduling, synchronization, memory management, virtual memory, virtual machines, device drivers and Input/Output (I/O), and file systems.
H. Fees: Yes, standard SOE fee
I. Course Prerequisites: CSCE A311 with minimum grade of C.
J. Registration Restrictions: None

III. Evaluation
Grades are based on exams, class assignments, and programming projects.

IV. Course Level Justification
This course is fundamental to computer systems to bridge application programming and the hardware interface, providing abstraction of hardware, usage policies, and general resource management, protection, and security of systems. The course builds upon data structures and algorithms presented in CSCE A311 and provides the systems foundation for senior level courses.

V. Outline
A. Lecture
   1. Operating System (OS) Concepts and Requirements
      a. Brief history
      b. Purpose
      c. Future challenges
   2. Overview Exploration of OS Abstractions
      a. Quick hardware review
      b. Major abstractions – processes/threads, files, device drivers, protection domains, shells, Graphical User Interface (GUI), virtual memory and machines
      c. System calls
      d. OS design and architecture approaches
      e. Run time environment for applications
   3. Processes and Threads
a. Processes - Portable Operating Systems Interface (POSIX)
b. POSIX threads
c. Scheduling (best effort, fair, real-time)
d. Inter-process communication
e. Thread safety and re-entrant code

4. Memory Management
   a. Review of hardware Memory Management Unit (MMU) and Virtual Memory (VM) features
   b. Logical and physical addressing
   c. Protection domains
   d. Paging and page replacement
   e. Segmentation and paged/segmented systems (e.g., Linux)

5. File systems
   a. File abstraction
   b. Directory structure (name spaces)
   c. File system data structures and indirection
   d. File system cache
   e. File system interface to block storage devices

6. Device Drivers and I/O
   a. Programmed character I/O interfaces (serial, terminal)
   b. Block oriented I/O and Direct Memory Access (DMA) interfaces (e.g., disk and network)
   c. Interrupts and I/O attention, request and completion
   d. Clocks
   e. Graphical User Interface (GUI) and Human Computer Interface (HCI) basics
   f. Power management

7. Synchronization
   a. Data corruption, race conditions and need for synchronization
   b. Semaphores and monitors (test-set-lock instructions)
   c. Critical sections for shared memory and resources
   d. Deadlock: conditions, avoidance, prevention, detection, recovery
   e. Barriers, spin-locks, and multi-core
   f. Message queues

8. Basic Security
   a. Threats – bug exploitation and denial of service attacks
   b. Authentication methods for login, biometrics, and passwords
   b. Fundamentals of encryption
   c. Access Control

9. Multi-Core Operating Systems
   a. Quick hardware review of multi-core Uniform Memory Access (UMA), Non-Uniform Memory Access (NUMA)
   b. Symmetric Multi-processing (SMP) and Asymmetric Multi-processing (AMP) concepts for multi-core
   c. Load balancing
   d. Virtualization and type-1/type-2 hypervisors
e. Distributed systems

B. Example Projects in any POSIX with source – e.g. Linux, Android Operating System (AOS), Apple Macintosh OS (OS/X), Unix, Solaris, Windows
   1. Fork and exec for basic shell
   2. Multi-threaded applications (e.g., image processing, prime hunting, interactive)
   3. Memory allocation, use monitoring, translation in kernel space, paging
   4. Simple file system exploration using Random Access Memory (RAM) disks
   5. Kernel I/O driver module - General Purpose I/O (GPIO), RAM disk, etc.
   6. Synchronization and inter-process communication (IPC), e.g. create and remove deadlock
   7. Multi-core and virtual machines (e.g., Virtual Box Linux with multi-core)

VI. Instructional Goals and Student Learning Outcomes

<table>
<thead>
<tr>
<th>A. Instructional Goals</th>
<th>The instructor will</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Instill and develop student understanding of the principles of operating systems.</td>
</tr>
<tr>
<td>2.</td>
<td>Explain purpose and policies for use of hardware by applications via the OS and the engineering challenges in so doing, today and the future.</td>
</tr>
<tr>
<td>3.</td>
<td>Instruct students on the use and extension of a prevalent operating system such as Linux, Windows, or suitable pedagogical operating system simulator.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. Student Learning Outcomes</th>
<th>Assessment Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Explain the operation of the building blocks of modern operating systems and use in general purpose computing.</td>
<td>Exams, quizzes, assignments, class projects</td>
</tr>
<tr>
<td>2. Demonstrate methodologies used in the design of operating systems.</td>
<td>Exams, quizzes, assignments, class projects</td>
</tr>
<tr>
<td>3. Extend existing operating systems and implement basic mechanisms in both the user space and kernel space protection domains.</td>
<td>Exams, quizzes, assignments, class projects</td>
</tr>
<tr>
<td>4. Develop the necessary code to complete the course projects.</td>
<td>Exams, quizzes, assignments, class projects</td>
</tr>
<tr>
<td>5. Implement course projects, test their operation, and report their findings to the instructor and colleagues.</td>
<td>Class project</td>
</tr>
<tr>
<td>6. Demonstrate recognition of the engineering tradeoffs necessary in the design of modern operating systems.</td>
<td>Exams, quizzes, assignments, class projects</td>
</tr>
</tbody>
</table>
VII.  Suggested Texts


VIII.  Bibliography and Resources

### Course Action Request

**University of Alaska Anchorage**

**Proposal to Initiate, Add, Change, or Delete a Course**

<table>
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<td>No Division Code</td>
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<th>3. Course Number</th>
<th>4. Previous Course Prefix &amp; Number</th>
<th>5a. Credits/CEUs</th>
<th>5b. Contact Hours (Lecture + Lab)</th>
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<tbody>
<tr>
<td>CSCE</td>
<td>A351</td>
<td>CS A351</td>
<td>3</td>
<td>(3+0)</td>
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</table>

6. **Complete Course Title**

Automata, Algorithms, and Complexity

(Abbreviated Title for Transcript (30 character))

7. Type of Course

<table>
<thead>
<tr>
<th>Academic</th>
<th>Preparatory/Development</th>
<th>Non-credit</th>
<th>CEU</th>
<th>Professional Development</th>
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8. Type of Action:
- [ ] Add
- [x] Change
- [ ] Delete

If a change, mark appropriate boxes:

- [x] Prefix
- [x] Credits
- [ ] Title
- [ ] Grading Basis
- [x] Course Description
- [ ] Test Score Prerequisites
- [ ] Other Restrictions
  - [ ] Class
  - [ ] Level
  - [ ] College
  - [ ] Major
- [x] Other Course Content Guides (please specify)

9. Repeat Status No # of Repeats Max Credits

- [x] n/a

10. Grading Basis

- [x] A-F
- [ ] P/NP
- [ ] NG

11. Implementation Date

- From: Fall/2013
- To: 99/9999

12. Cross Listed with

- Stacked with

13a. **Impacted Courses or Programs:** List any programs or college requirements that require this course.

Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at [www.uaa.alaska.edu/governance](http://www.uaa.alaska.edu/governance).

<table>
<thead>
<tr>
<th>Impacted Program/Course</th>
<th>Date of Coordination</th>
<th>Chair/Coordinator Contacted</th>
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<tr>
<td>1. See attached spreadsheet</td>
<td></td>
<td></td>
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<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Initiator Name (typed): Martin Cenek

Initiator Signed Initials: __________

Date: __________

13b. **Coordination Email**

[submitted to Faculty Listserv:](mailto:uaa-faculty@lists.uaa.alaska.edu)

Date: 12/10/2012

13c. **Coordination with Library Liaison**

Date: 12/10/2012

14. **General Education Requirement**

Mark appropriate box:

- [ ] Oral Communication
- [ ] Written Communication
- [ ] Quantitative Skills
- [ ] Humanities
- [ ] Fine Arts
- [ ] Social Sciences
- [ ] Natural Sciences
- [ ] Integrative Capstone

15. **Course Description** *(suggested length 20 to 50 words)*

Study of the theory of computing and algorithm analysis and design. Topics include: context free-grammars and parsing, finite automata and regular languages, pushdown automata and context-free grammars, deterministic and non-deterministic Turing machines, decidability and computability. In the algorithm domain, the course provides an introduction to analysis and complexity of algorithms, searching/sorting algorithms, mathematical algorithms, and graph theoretic algorithms. Introduction to complexity theory.

16a. **Course Prerequisite(s)** *(list prefix and number or test code and score)*

(CSE A311 and MATH A231) with minimum grade of C.

16b. **Co-requisite(s)** *(concurrent enrollment required)*

n/a

16c. **Other Restriction(s)**

- [ ] College
- [ ] Major
- [ ] Class
- [ ] Level

16d. **Registration Restriction(s)** *(non-codable)*

n/a

17. [x] Mark if course has fees

Yes, standard SOE fee

18. [ ] Mark if course is a selected topic course

19. **Justification for Action**

Revision to establish a course common to both the Computer Science and Computer Systems Engineering programs and update the course content guide.
<table>
<thead>
<tr>
<th>Initiator (faculty only)</th>
<th>Date</th>
<th>Approve</th>
<th>Disapprove</th>
<th>Dean/Director of School/College</th>
<th>Date</th>
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<td>Martin Cenek</td>
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<th>Disapprove</th>
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<th>Date</th>
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<th>Disapprove</th>
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<th>Date</th>
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**Course Being Changed:** CS A351

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<th>Type of Impact (course or program)</th>
<th>Catalog Page</th>
<th>Type/Date of Notification</th>
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<td>12/1/12</td>
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<tr>
<td>BS, Computer Science</td>
<td>Program requirement</td>
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<td>12/1/12</td>
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<td>Program requirement</td>
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<td>12/1/12</td>
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<td>BSE, Computer Systems Engineering</td>
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<td>245</td>
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<td>Prerequisite</td>
<td>381</td>
<td>12/1/12</td>
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</tbody>
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**Contacted:**
- Fred Rainey (farainey@uaa.alaska.edu)
- Kenrick Mock
I. **Revision Date:** December 20th, 2012

II. **Course Information**
   A. **College:** School of Engineering
   B. **Course Subject/Number:** CSCE A351
   C. **Credits:** 3
   D. **Contact Hours:** (3+0) 45 contact lecture hours (3 contact lecture hours/week x 15 weeks = 45) plus 90 hours outside work (6 hours outside lecture/week x 15 weeks = 90) for a total of 135 hours
   E. **Course Title:** Automata, Algorithms, and Complexity
   F. **Repeat Status:** No
   G. **Grading Basis:** A-F
   H. **Course Description:** Study of the theory of computing and algorithm analysis and design. Topics include: context free-grammars and parsing, finite automata and regular languages, pushdown automata and context-free grammars, deterministic and nondeterministic Turing machines, decidability and computability. In the algorithm domain, the course provides an introduction to analysis and complexity of algorithms, searching/sorting algorithms, mathematical algorithms, and graph theoretic algorithms. Introduction to complexity theory.
   I. **Course Prerequisites:** (CSCE A311 and MATH A231) with minimum grade of C.
   J. **Fees:** Yes, standard SOE fee

III. **Course Level Justification**

   The course is taught nationwide at the upper division (junior) level as a theory course required for computer science majors. It builds upon concepts presented in CSCE A311 and provides theoretical foundations of computing for senior level courses.

IV. **Instructional Goals and Student Learning Outcomes**

<table>
<thead>
<tr>
<th><strong>A. Instructional Goals.</strong> The instructor will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduce fundamental topics in the theory of computing such as formal languages, computability, and a formal model of computing.</td>
</tr>
<tr>
<td>2. Introduce the notion of computational complexity.</td>
</tr>
<tr>
<td>3. Introduce students to mathematical methods of algorithm analysis and design.</td>
</tr>
<tr>
<td>4. Expose students to a wide variety of algorithms and algorithmic techniques.</td>
</tr>
</tbody>
</table>
## B. **Student Learning Outcomes**

Students will be able to:

<table>
<thead>
<tr>
<th></th>
<th>Assessment method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Demonstrate the fundamental nature of computation and complexity.</td>
<td>Assignments, Quizzes, Exams</td>
</tr>
<tr>
<td>2. Apply formal language concepts to the design of programs including parsers, compilers, or natural language processors.</td>
<td>Assignments, Quizzes, Exams</td>
</tr>
<tr>
<td>3. Devise rigorous and correct proofs relating to automata, algorithms, and complexity.</td>
<td>Assignments, Quizzes, Exams</td>
</tr>
<tr>
<td>4. Analyze the space and runtime behavior of algorithms.</td>
<td>Assignments, Quizzes, Exams</td>
</tr>
<tr>
<td>5. Implement a variety of algorithms and apply them to solve new problems.</td>
<td>Assignments, Quizzes, Exams</td>
</tr>
</tbody>
</table>

## V. **Guidelines for Evaluation**

A. Assignments  
B. Exams  
C. Quizzes

## VI. **Topical Course Outline**

1. **Basic Concepts of Computing**
   a. Review of set theory  
   b. Grammatical basis of language  
   c. Historical background

2. **Finite Automata and Regular Languages**
   a. Lexical analysis  
   b. Deterministic finite automata  
   c. Nondeterministic finite automata  
   d. Regular grammars and expressions

3. **Pushdown Automata and Context-Free Languages**
   a. Pushdown automata  
   b. Context-free grammars  
   c. Left-to-right-Leftmost (LL(k)) and Left-to-right-Rightmost (LR(k)) parsers

4. **Turing Machines**
   a. Turing machines and computability  
   b. Language acceptors  
   c. Turing-acceptable languages

5. **Algorithmic Problem Types**
   a. Integer programming  
   b. Graph problems  
   c. Search problems  
   d. Geometric problems
6. Mathematical Techniques
   a. Complexity notations
   b. Recurrence relations
   c. Worst-case and amortized analysis

7. Graph and Geometric Algorithms
   a. Graph searching
   b. Geometric representation and manipulation

8. Complexity Theory
   a. P and NP (Polynomial and Nondeterministic Polynomial)
   b. NP complete problems
   c. NP hard problems

9. Greedy Algorithms
   a. Tree and path problems
   b. String matching
   c. Matroids

VII. Suggested Texts


VIII. Bibliography


Course Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Course

1a. School or College
EN SOENGR

1b. Division
No Division Code

1c. Department
Computer Science and Engineering

2. Course Prefix
CSCE

3. Course Number
A360

4. Previous Course Prefix & Number
CS A360

5a. Credits/CEUs
3

5b. Contact Hours
(Lecture + Lab)
(3+0)

6. Complete Course Title
Database Systems

7. Type of Course
☒ Academic ☐ Preparatory/Development ☐ Non-credit ☐ CEU ☐ Professional Development

8. Type of Action:
☐ Add ☒ Change ☐ Delete

If a change, mark appropriate boxes:
☒ Prefix ☐ Credits ☐ Contact Hours
☒ Title ☐ Course Number ☐ Repeat Status
☒ Grading Basis ☐ Cross/Listed/Stacked
☒ Course Description ☐ Course Prerequisites
☐ Test Score Prerequisites ☐ Co-requisites
☐ Other Restrictions ☐ Registration Restrictions
☒ Class ☐ Level ☐ College ☐ Major
☒ Other Content Guide (please specify)

9. Repeat Status No
# of Repeats n/a Max Credits n/a

10. Grading Basis
☒ A-F ☐ P/NP ☐ NG

11. Implementation Date
From: Fall/2013 To: 99/9999

12. ☐ Cross Listed with
☐ Stacked with

13a. Impacted Courses or Programs: List any programs or college requirements that require this course.
Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at www.uaa.alaska.edu/governance.

<table>
<thead>
<tr>
<th>Impacted Program/Course</th>
<th>Date of Coordination</th>
<th>Chair/Coordinator Contacted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. B.A., B.S., Computer Science</td>
<td>12/10/2012</td>
<td>Kenrick Mock</td>
</tr>
<tr>
<td>2. B.S. Natural Sciences</td>
<td>12/10/2012</td>
<td>Khrys Duddleston</td>
</tr>
<tr>
<td>3.</td>
<td></td>
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</tr>
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</table>

Initiator Name (typed): Kirk Scott

Initiator Signed Initials: __________ Date: ____________

13b. Coordination Email
Date: 12/10/2012

submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison
Date: 12/10/2012

14. General Education Requirement
Mark appropriate box:
☐ Oral Communication
☐ Written Communication
☐ Quantitative Skills
☐ Humanities
☐ Fine Arts
☐ Social Sciences
☐ Natural Sciences
☐ Integrative Capstone

15. Course Description (suggested length 20 to 50 words)
Application of data modeling, relational database concepts and design, normalization theory, and structured query language. Study of underlying data structures and implementations of data processing architectures.

16a. Course Prerequisite(s) (list prefix and number or test code and score)
(CSCE A202 or CSCE A211) with minimum grade of C.

16b. Co-requisite(s) (concurrent enrollment required)
n/a

16c. Other Restriction(s)
☐ College ☐ Major ☐ Class ☐ Level

16d. Registration Restriction(s) (non-codable)
n/a

17. ☒ Mark if course has fees
Yes, standard SOE fee

18. ☐ Mark if course is a selected topic course

19. Justification for Action
Revision to establish a course common to both the Computer Science and Computer Systems Engineering programs and update the course content guide.

Initiator (faculty only)
Kirk Scott
Initiator (TYPE NAME)

☐ Approved
☐ Disapproved

Dean/Director of School/College

Date

Undergraduate/Graduate Academic

Date

Board Chair

Date

Provost or Designee

Date
Course Content Guide
University of Alaska Anchorage
School of Engineering
Department of Computer Science and Engineering

I. Revision Date: November 15th, 2012

II. Course Information
A. College: School of Engineering
B. Course Subject/Number: CSCE A360
C. Credits: 3
D. Contact Hours: (3+0) 45 contact lecture hours (3 contact lecture hours/week x 15 weeks = 45) plus 90 hours outside work (6 hours outside lecture/week x 15 weeks = 90) for a total of 135 hours
E. Course Title: Database Systems
F. Repeat Status: No
G. Grading Basis: A-F
H. Course Description: Application of data modeling, relational database concepts and design, normalization theory, and structured query language. Study of underlying data structures and implementations of data processing architectures.
I. Course Prerequisites: (CSCE A202 or CSCE A211) with minimum grade of C.
J. Fees: Yes, standard SOE fee

III. Course Level Justification

This is an upper division course in the model curriculum developed by the professional association for computing. Success depends on the background and intellectual maturity acquired from introductory programming courses or work experience.

IV. Instructional Goals and Student Learning Outcomes

<table>
<thead>
<tr>
<th>A. Instructional Goals</th>
<th>The instructor will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Demonstrate how to apply the concepts of relational database theory to the creation and maintenance of databases.</td>
</tr>
<tr>
<td>2.</td>
<td>Demonstrate how to apply queries to a relational database.</td>
</tr>
<tr>
<td>3.</td>
<td>Guide students through the development, documentation, and implementation of a small database project.</td>
</tr>
</tbody>
</table>
B. **Student Learning Outcomes.** Students will be able to:

<table>
<thead>
<tr>
<th></th>
<th>Assessment method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Create entity-relationship diagrams and data dictionaries showing the contents of and relationships within an arbitrary database.</td>
</tr>
<tr>
<td>2.</td>
<td>Normalize a set of tables given the information sources and requirements that those tables are to be built on and create entity-relationship diagrams and data dictionaries for them.</td>
</tr>
<tr>
<td>3.</td>
<td>Form queries in the Structured Query Language (SQL) to elicit the correct answers to any possible information request on a given set of tables.</td>
</tr>
<tr>
<td>4.</td>
<td>Develop a small scale database project in a subject domain of their choice, creating and populating tables, establishing relationships, and creating a representative set of queries for that database.</td>
</tr>
</tbody>
</table>

V. **Guidelines for Evaluation**

A. Assignments  
B. Exams  
C. Project

VI. **Topical Course Outline**

1. Database Management System Applications  
   a. Purpose of database management  
   b. Relational and other database technologies  
   c. Transaction management  
   d. Data mining  
2. The Relational Model  
   a. Relational algebra  
   b. Domains  
   c. Functional and multi-valued dependencies  
   d. One-to-one, one-to-many, and many-to-many relationships  
3. SQL  
   a. Data definition syntax  
   b. Select, project, and join queries  
   c. Subqueries  
   d. Complex queries  
4. Normalization  
   a. Domains and nulls  
   b. Referential integrity  
   c. First, Second, Third, and Boyce-Codd normal forms
d. Fourth, Fifth, and Domain-Key Normal forms

5. System Hardware and Software Support
   a. Physical file organization and storage
   b. Indexing and hashing
   c. B-Tree indexes
   d. Bitmap indexes

6. Concurrency Control and Recovery
   a. Lock based techniques
   b. Timestamp based techniques
   c. Deadlock handling
   d. Logging and rollback

7. The PHP Scripting Language
   a. Basic syntax
   b. Arrays, strings, and data manipulation
   c. Object-orientation with PHP
   d. PEAR: PHP Extension and Application Repository
   e. Errors, debugging, and deployment

8. MySQL
   a. MySQL and SQL
   b. Querying Web databases
   c. Writing to Web databases
   d. Validation with PHP and JavaScript
   e. Sessions
   f. Authentication and Security
   g. Report generation

VII. Suggested Texts


VIII. Bibliography

Course Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Course

1a. School or College
EN SOENGR

1b. Division
No Division Code

1c. Department
Computer Science and Engineering

2. Course Prefix
CSCE

3. Course Number
A365

4. Previous Course Prefix & Number
CSE A355

5a. Credits/CEUs
3

5b. Contact Hours
(Lecture + Lab) (3+0)

6. Complete Course Title
Computer Networks

Abbreviated Title for Transcript (30 character)

7. Type of Course
☑ Academic ☐ Preparatory/Development ☐ Non-credit ☐ CEU ☐ Professional Development

8. Type of Action:
☑ Add ☐ Change ☐ Delete

If a change, mark appropriate boxes:

☑ Prefix ☐ Credits ☐ Credits/CEU ☐ Contact Hours ☐ Title ☐ Course Number
☐ Grading Basis ☐ Repeat Status ☐ Contact Hours ☐ Cross-Listed/Stacked ☐ Co-requisites
☐ Course Description ☐ Course Prerequisites ☐ Registration Restrictions
☐ Other Restrictions ☐ Class ☐ Level ☐ College ☐ Major ☑ Other Course Content Guide (please specify)

9. Repeat Status No
☐ # of Repeats n/a ☐ Max Credits n/a

10. Grading Basis
☑ A-F ☐ P/NP ☐ NG

11. Implementation Date
From: Fall/2013 To: 99/9999

12. ☐ Cross Listed with

☐ Stacked with

Cross-Listed Coordination Signature

13a. Impacted Courses or Programs: List any programs or college requirements that require this course.

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<td>1. BSE CSE Required, BSE CSE Minor</td>
<td>244, 250</td>
<td>12/1/12</td>
<td>Kenrick Mock</td>
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<td>2. BSE EE Selective</td>
<td>245</td>
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<td>3. CSE A465</td>
<td>382</td>
<td>12/1/12</td>
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Initiator Name (typed): Kenrick Mock
Initiator Signed Initials: _________
Date: __________________

13b. Coordination Email
Date: 2012-12-15
submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison
Date: 2012-12-15

14. General Education Requirement
Mark appropriate box:
☐ Oral Communication ☐ Written Communication ☐ Quantitative Skills ☐ Humanities
☐ Fine Arts ☐ Social Sciences ☐ Natural Sciences ☐ Integrative Capstone

15. Course Description (suggested length 20 to 50 words)
Network architectures, layered protocols, internet protocols, and network service interfaces. Emphasis on design and implementation of networking hardware, including routers, bridges, switches, hubs, and repeaters. Local networks, addressing, routing, flow control, queuing, routing protocols, packet loss.

16a. Course Prerequisite(s) ([list prefix and number])
(CSCE A211 and (STAT A307 or STAT A253)) with minimum grade of C.

16b. Test Score(s)
n/a

16c. Co-requisite(s) (concurrent enrollment required)

16d. Other Restriction(s)
☐ College ☐ Major ☐ Class ☐ Level

16e. Registration Restriction(s) (non-codable)
n/a

17. ☑ Mark if course has fees Yes, standard SOE fee

18. ☐ Mark if course is a selected topic course

19. Justification for Action
Revision to establish a course common to both the Computer Science and Computer Systems Engineering programs and update the course content guide; added STAT A307 or STAT A253 as a prerequisite.

Initiator (faculty only)

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11. Implementation Date
From: Fall/2013 To: 99/9999

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Cross-Listed Coordination Signature

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10. Grading Basis
☑ A-F ☐ P/NP ☐ NG

11. Implementation Date
From: Fall/2013 To: 99/9999

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☐ Stacked with

Cross-Listed Coordination Signature

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Initiator Signed Initials: _________
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Date: 2012-12-15

14. General Education Requirement
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16b. Test Score(s)
n/a

16c. Co-requisite(s) (concurrent enrollment required)

16d. Other Restriction(s)
☐ College ☐ Major ☐ Class ☐ Level

16e. Registration Restriction(s) (non-codable)
n/a

17. ☑ Mark if course has fees Yes, standard SOE fee

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19. Justification for Action
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Initiator (faculty only)

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</table>
Course Content Guide
University of Alaska Anchorage
School of Engineering
Department of Computer Science and Engineering

I. Revision Date: January 25, 2013

II. Course Information
A. College: Engineering
B. Course Subject/Number: CSCE A365
C. Credits: 3
D. Contact Hours: (3+0) 45 contact lecture hours (3 contact lecture hours/week x 15 weeks = 45) plus 90 hours outside work (6 hours outside lecture/week x 15 weeks = 90) for a total of 135 hours
E. Course Title: Computer Networks
F. Repeat Status: No
G. Grading Basis: A-F
H. Course Description: Network architectures, layered protocols, internet protocols, and network service interfaces. Emphasis on design and implementation of networking hardware, including routers, bridges, switches, hubs, and repeaters. Local networks, addressing, routing, flow control, queuing, routing protocols, packet-loss.
I. Course Prerequisites: [CSCE A211 and (STAT A307 or STAT A253)] with minimum grade of C.
J. Fees: Yes, standard SOE fee

III. Course Level Justification

This course builds upon concepts presented at the 200 or 300 level. It provides foundational material in computer networking for 300 and 400 level courses.

IV. Instructional Goals and Student Learning Outcomes

<table>
<thead>
<tr>
<th>A. Instructional Goals. The instructor will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Aid students in understanding different networking devices.</td>
</tr>
<tr>
<td>2. Show students by example a networked environment with engineering applications.</td>
</tr>
<tr>
<td>3. Demonstrate by example the use of different network layer protocols.</td>
</tr>
<tr>
<td>4. Explain shortest path algorithm code in relation to different engineering applications.</td>
</tr>
<tr>
<td>5. Provide students with the necessary skills to write networked programs.</td>
</tr>
</tbody>
</table>
6. Prepare students for engineering design with the writing a networked application on top of network built during course using protocols learned.

<table>
<thead>
<tr>
<th>B. Student Learning Outcomes</th>
<th>Assessment method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Identify different applications of computer networks in industry.</td>
<td>Assignments, Exams, Project</td>
</tr>
<tr>
<td>2. Understand the technologies involved with voice and data communication.</td>
<td>Assignments, Exams, Project</td>
</tr>
<tr>
<td>3. Build a network from components that meet certain specifications.</td>
<td>Assignments, Exams, Project</td>
</tr>
<tr>
<td>4. Explain multiplexing and different related technologies.</td>
<td>Assignments, Exams, Project</td>
</tr>
<tr>
<td>5. Explain the difference between the Transmission Control Protocol (TCP) and the User Datagram Protocol (UDP).</td>
<td>Assignments, Exams, Project</td>
</tr>
<tr>
<td>6. Differentiate the different multiple-access schemes and use them in an engineering application.</td>
<td>Assignments, Exams, Project</td>
</tr>
</tbody>
</table>

V. Guidelines for Evaluation
A. Assignments
B. Exams
C. Project

VI. Topical Course Outline
1. Introduction to object-oriented programming
2. Network topologies
3. Signaling, modulation, multiplexing, synchronization
4. Frame synchronization
5. Error detection and control
6. Flow control mechanisms
7. Circuit, virtual circuit, and packet switching
8. Local area network technologies
9. Multiple-access schemes (Collision Sense Multiple Access / Collision Detection, Collision Sense Multiple Access, Collision Avoidance, token passing)
10. Network Programming
11. Networking devices – repeaters, hubs, bridges, switches, routers, gateways
13. Internet routing protocols (Routing Information Protocol, Open Shortest Path First, Border Gateway Protocol)
14. Shortest path algorithms
15. TCP and UDP

VII. Suggested Texts


VIII. Bibliography

**Course Action Request**

University of Alaska Anchorage

Proposal to Initiate, Add, Change, or Delete a Course

<table>
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<th>1c. Department</th>
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<td>EN SOENGR</td>
<td>No Division Code</td>
<td>Computer Science and Engineering</td>
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<tr>
<th>2. Course Prefix</th>
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<th>5a. Credits/CEUs</th>
<th>5b. Contact Hours (Lecture + Lab)</th>
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<tr>
<td>CSCE</td>
<td>A385</td>
<td>CS A385</td>
<td>3</td>
<td>(3+0)</td>
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<thead>
<tr>
<th>6. Complete Course Title</th>
<th>Abbreviated Title for Transcript (30 character)</th>
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<tbody>
<tr>
<td>Computer Graphics</td>
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<tr>
<th>7. Type of Course</th>
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<td>☒ Academic</td>
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<td>[ ] CEU</td>
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<td>[ ] Professional Development</td>
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<tr>
<th>8. Type of Action:</th>
<th>Add</th>
<th>Change</th>
<th>Delete</th>
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<tbody>
<tr>
<td>If a change, mark</td>
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<td>appropriate boxes:</td>
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<td>☒ Other Restrictions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☒ Class</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☒ Level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☒ College</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☒ Major</td>
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</tr>
<tr>
<td>☒ Other Course Content</td>
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<td></td>
</tr>
<tr>
<td>Description (please specify)</td>
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<table>
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<th>9. Repeat Status No</th>
<th># of Repeats</th>
<th>Max Credits</th>
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<th>A-F</th>
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<th>NG</th>
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<tbody>
<tr>
<td></td>
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<table>
<thead>
<tr>
<th>11. Implementation Date</th>
<th>semester/year</th>
</tr>
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<tbody>
<tr>
<td>From: Fall/2013</td>
<td>To: 99/9999</td>
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<table>
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<tr>
<th>12. Cross Listed with</th>
<th>Stacked with</th>
<th>Cross-Listed Coordination Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>13a. Impacted Courses or Programs:</th>
<th>List any programs or college requirements that require this course.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make type into fields provided</td>
<td>More than three entries, submit a separate table. A template is</td>
</tr>
<tr>
<td>in table. If more than three</td>
<td>available at <a href="http://www.uaa.alaska.edu/governance">www.uaa.alaska.edu/governance</a>.</td>
</tr>
<tr>
<td>entries, submit a separate table.</td>
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<table>
<thead>
<tr>
<th>Impacted Program/Course</th>
<th>Catalog Page(s) Impacted</th>
<th>Date of Coordination</th>
<th>Chair/Coordinator Contacted</th>
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</thead>
<tbody>
<tr>
<td>1. BS Natural Sciences</td>
<td>123</td>
<td>12/1/12</td>
<td>Kenrick Mock</td>
</tr>
<tr>
<td>(selective)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. BSE Computer</td>
<td>245</td>
<td>12/1/12</td>
<td>Kenrick Mock</td>
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<tr>
<td>Science and Engineering</td>
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<td></td>
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<tr>
<td>(selective)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. BS Natural Sciences</td>
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<td>(selective)</td>
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<tr>
<th>Initiator Name (typed):</th>
<th>Sam Siewert</th>
<th>Initiator Signed Initials:</th>
<th>Date:</th>
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<table>
<thead>
<tr>
<th>13b. Coordination Email</th>
<th>Date: 12/1/2012</th>
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<tr>
<th>13c. Coordination with Library Liaison</th>
<th>Date: 12/1/2012</th>
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<th>14. General Education Requirement</th>
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<td>Oral Communication</td>
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<td>Fine Arts</td>
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<td>Social Sciences</td>
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<tr>
<td></td>
<td>Natural Sciences</td>
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<td>Integrative Capstone</td>
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<table>
<thead>
<tr>
<th>15. Course Description (suggested length 20 to 50 words)</th>
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<tbody>
<tr>
<td>Introduction to computer graphics. Topics include</td>
</tr>
<tr>
<td>polygon and ray trace rendering of objects in scenes,</td>
</tr>
<tr>
<td>render languages and Application Programming Interfaces</td>
</tr>
<tr>
<td>(APIs), theory for generation of pixel values in a</td>
</tr>
<tr>
<td>render buffer with consideration of color, lighting,</td>
</tr>
<tr>
<td>shading, texture, surfaces, hidden surfaces, and</td>
</tr>
<tr>
<td>materials, and the viewpoint, method of projection,</td>
</tr>
<tr>
<td>and mathematics for rendering and viewing objects.</td>
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<table>
<thead>
<tr>
<th>16a. Course Prerequisite(s) (list prefix and number)</th>
<th>16b. Test Score(s) n/a</th>
<th>16c. Co-requisite(s) (concurrent enrollment required) n/a</th>
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<tbody>
<tr>
<td>(CSCE A311 and MATH A201) with minimum grade of C.</td>
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<table>
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<th>16d. Other Restriction(s)</th>
<th>16e. Registration Restriction(s) (non-codable) n/a</th>
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<td>☑ College</td>
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<td>☑ Major</td>
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<td>☑ Class</td>
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<tr>
<td>☑ Level</td>
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<thead>
<tr>
<th>17. Mark if course has fees</th>
<th>18. Mark if course is a selected topic course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, standard SOE fee</td>
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<table>
<thead>
<tr>
<th>19. Justification for Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revision to establish a</td>
</tr>
<tr>
<td>course common to both the</td>
</tr>
<tr>
<td>Computer Science and</td>
</tr>
<tr>
<td>Computer Systems Engineering</td>
</tr>
<tr>
<td>programs and update the</td>
</tr>
<tr>
<td>course content guide.</td>
</tr>
<tr>
<td>Position</td>
</tr>
<tr>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>Initiator (faculty only)</td>
</tr>
<tr>
<td>Sam Siewert (TYPE NAME)</td>
</tr>
<tr>
<td>Dean/Director of School/College</td>
</tr>
<tr>
<td>Department Chairperson</td>
</tr>
<tr>
<td>Undergraduate/Graduate Academic Board Chairperson</td>
</tr>
<tr>
<td>Curriculum Committee Chairperson</td>
</tr>
<tr>
<td>Provost or Designee</td>
</tr>
</tbody>
</table>
I. **Initiation Date:** December 2012

II. **Course Information**

A. **College/School:** School of Engineering  
B. **Course Title:** Computer Graphics  
C. **Course Subject/Number:** CSCE A385  
D. **Credit Hours:** 3.0 Credits  
E. **Contact Time:** 3+0 Contact Time  
F. **Grading Information:** A-F  
G. **Course Description:** Introduction to computer graphics. Topics include polygon and ray trace rendering of objects in scenes, render languages and Application Programming Interfaces (APIs), theory for generation of pixel values in a render buffer with consideration of color, lighting, shading, texture, surfaces, hidden surfaces, and materials, and the viewpoint, method of projection, and mathematics for rendering and viewing objects.  
H. **Fees:** Yes, standard SOE fee  
I. **Course Prerequisites:** (CSCE A311 and MATH 201) with minimum grade of C.  
J. **Registration Restrictions:** None

III. **Evaluation**

Grades are based on written examination, class assignments, and projects.

IV. **Course Level Justification**

This course allows students to apply programming skills and mathematics to focus on an important component of the computational platform – the human interface. It furthermore is compute-intensive and requires application of fundamental algorithms and data structures learned in lower division courses.

V. **Outline**

A. Lecture  
   1. Graphics Concepts  
      a. Brief history  
      b. Purpose  
      c. Future challenges  
   2. Basic Mathematics Review  
      a. Vector matrix basics  
      b. Polygonal trigonometry  
      c. Viewing and projections  
      d. Interpolation – linear, bi-linear, tri-linear  
   3. Raster Images and Color  
      a. Pixel encoding  
      b. Color perception, photometry and radiometry  
      c. Frame resolution, aspect ratio, coordinates, and compression
d. Moving pictures and compression

4. Ray Tracing
   a. Orthographic and perspective projection
   b. Viewing rays
   c. Render plane and object intersection
   d. Ray tracing rendering and shading interfaces
   e. Lighting, shading, and reflection
   f. Transparency and refraction
   g. Solid geometry specification
   h. Depth of field

5. Linear Algebra and Transformation Vector/Matrix Review
   a. Determinates
   b. Matrices
   c. Eigenvalues and diagonalization
   d. 2D and 3D transformations
   e. Matrix inversion and coordinate transformation

6. Viewing
   a. Viewing transformation
   b. Projective transformation
   c. Perspective projection
   d. field-of-view

7. Rendering
   a. Rastering
   b. Hidden surface removal
   c. Shading
   d. Texture
   e. Meshes
   f. Spatial data structures

8. Image Processing
   a. Convolution
   b. Image enhancement
   c. Mixing digital video and graphics

9. Surfaces and Modeling
   a. Curves
   b. Skeletal models
   c. Solid geometry
   d. Warping

B. Example Projects using Pixie or any Renderman Ray tracing tool and the Open Graphics Language (OpenGL) or any Polygon rendering environment
   1. Raster images and sequences with Motion Pictures Experts Group (MPEG) and Portable BitMap (PBM), Portable GreyMap (PGM), and Portable PixMap (PPM)
   2. Ray tracing rendering and generation of Computer Graphics (CG) movie
   3. Polygon rendering of simple cubes with hidden surface removal
4. Ray trace rendering with advanced lighting, reflection, refraction, and shadows
5. Image processing to enhance digital images and integrate with CG imagery
6. Interactive viewing angle and projection interactive rendering
7. Polygon rendering of smooth curved surfaces

VI. Instructional Goals and Student Learning Outcomes

<table>
<thead>
<tr>
<th>A. Instructional Goals.</th>
<th>The instructor will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Instill and develop student understanding of the principles of polygon and ray trace rendering.</td>
</tr>
<tr>
<td>2.</td>
<td>Explain basic interaction with render/shading interfaces as well as fundamental mathematics to render form simple points, lines and polygon surfaces.</td>
</tr>
<tr>
<td>3.</td>
<td>Instruct students on the use and extension of a prevalent rendering tools and environments such as RenderMan using Pixie and OpenGL.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. Student Learning Outcomes.</th>
<th>Upon completion of this course, students will be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Explain the operation of graphics processing units, rendering interfaces, and mathematics of rendering.</td>
</tr>
<tr>
<td></td>
<td>Assessment Methods: Exams, quizzes, assignments, projects</td>
</tr>
<tr>
<td>2.</td>
<td>Demonstrate methodologies used in the design of ray trace rendering systems.</td>
</tr>
<tr>
<td></td>
<td>Assessment Methods: Exams, quizzes, assignments, projects</td>
</tr>
<tr>
<td>3.</td>
<td>Demonstrate methodologies used in the design of polygon rendering systems.</td>
</tr>
<tr>
<td></td>
<td>Assessment Methods: Exams, quizzes, assignments, projects</td>
</tr>
<tr>
<td>4.</td>
<td>Develop the necessary code to complete the course projects.</td>
</tr>
<tr>
<td></td>
<td>Assessment Methods: Exams, quizzes, assignments, projects</td>
</tr>
<tr>
<td>5.</td>
<td>Implement course projects, test their operation, and report their findings to the instructor and colleagues.</td>
</tr>
<tr>
<td></td>
<td>Assessment Methods: Projects</td>
</tr>
<tr>
<td>6.</td>
<td>Demonstrate recognition of the engineering tradeoffs necessary in the design of production computer generated imagery and interactive 3D graphics.</td>
</tr>
<tr>
<td></td>
<td>Assessment Methods: Exams, quizzes, assignments, projects</td>
</tr>
</tbody>
</table>

VII. Suggested Text

VIII. Bibliography and Resources
Foley, J.D. and Van Dam, A. Introduction to Computer Graphics, Addison Wesley, Boston, MA, 1994
Proposal to Initiate, Add, Change, or Delete a Course

Initiator (faculty only) Kenrick Mock
Initiator (TYPE NAME) ____________________________ Date: __________________

Approved Disapproved Dean/Director of School/College Date: __________________

Approved Disapproved Undergraduate/Graduate Academic Board Chairperson Date: __________________

Approved Disapproved Provost or Designee Date: __________________

If a change, mark appropriate boxes:

Add Change Delete

Prefix Credits

Course Number Contact Hours

Repeat Status

Test Score Prerequisites Course Prerequisites

Registration Restrictions

Contact Hours

Cross-Listed/Stacked

Other Restrictions

Course Prerequisites

Cross-Listed Coordination Signature

1a. School or College
1b. Division
1c. Department
EN SOENGR No Division Code Computer Science and Engineering

2. Course Prefix
3. Course Number
4. Previous Course Prefix & Number
5. Credits/CEUs
6. Complete Course Title
7. Type of Course
8. Type of Action
EN SOENGR A395 CS A395

Internship in Computing

Academic Preparatory/Development Non-credit CEU Professional Development

Add Change Delete

9. Repeat Status

Yes # of Repeats

10. Grading Basis

A-F P/NP NG

11. Implementation Date

From: Fall/2013 To: 99/9999

12. Cross Listed with

Stacked with

13a. Impacted Courses or Programs:

List any programs or college requirements that require this course.

13b. Coordination Email

Date: 12/10/2012

submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison

Date: 12/10/2012

14. General Education Requirement

Mark appropriate box:

Oral Communication Written Communication Quantitative Skills Humanities

Fine Arts Social Sciences Natural Sciences Integrative Capstone

15. Course Description (suggested length 20 to 50 words)

Application of computer science or computer engineering skills in a professional work setting. Special Note: May be taken up to three times, but only 3 credits may be applied toward CS or CSE major requirements.

16a. Course Prerequisite(s) (list prefix and number)

CSCE A211 with a minimum grade of C.

16b. Test Score(s)

n/a

16c. Co-requisite(s) (concurrent enrollment required)

Instructor approval

16d. Other Restriction(s)

College Major Class Level

Registration Restriction(s) (non-codable)

16e.

17. Mark if course has fees Yes, standard SOE fee

18. Mark if course is a selected topic course

19. Justification for Action

Revision to establish a course common to both the Computer Science and Computer Systems Engineering programs and update the course content guide. The contact hours changed to lab is more accurate than the previous designation as 3 hours of lecture. This is not a lecture-based course. The prerequisites enforce some introductory programming experience for the intern.

Initiator (faculty only) Kenrick Mock
Initiator (TYPE NAME) ____________________________ Date: __________________

Approved Disapproved Dean/Director of School/College Date: __________________

Approved Disapproved Undergraduate/Graduate Academic Board Chairperson Date: __________________

Approved Disapproved Provost or Designee Date: __________________
Course Content Guide  
University of Alaska Anchorage  
School of Engineering  
Department of Computer Science and Engineering

I. **Revision Date:** December 1, 2012

II. **Course Information**  
A. **College:** School of Engineering  
B. **Course Subject/Number:** CSCE A395  
C. **Credits:** 3  
D. **Contact Hours:** (0+9) 0 contact lecture hours plus 135 hours outside work (9 hours outside work x 15 weeks = 135) for a total of 135 hours  
E. **Course Title:** Internship in Computing  
F. **Repeat Status:** Yes, up to 9 credits  
G. **Grading Basis:** P/NP  
H. **Course Description:** Application of computer science or computer engineering skills in a professional work setting. Special Note: May be taken up to three times, but only 3 credits may be applied toward CS or CSE major requirements.  
I. **Course Prerequisites:** CSCE A211 with minimum grade of C.  
J. **Fees:** Yes, standard SOE fee  
K. **Registration Restrictions:** Instructor approval

III. **Course Level Justification**  
The student is required to have completed the introductory programming sequence prior to enrolling in this course to ensure that the student can apply basic programming skills for the organization. Students are responsible for gaining employment in the organization.

IV. **Instructional Goals and Student Learning Outcomes**

<table>
<thead>
<tr>
<th>A. <strong>Instructional Goals.</strong> The instructor will:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Provide students with professional work experience in the field of computing.</td>
<td></td>
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</tbody>
</table>
B. **Student Learning Outcomes.** Students will be able to:

<table>
<thead>
<tr>
<th></th>
<th>Assessment method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Apply acquired computing skills in a professional work setting consistent with the background of the student</td>
<td>Project implementation, Employer Evaluation</td>
</tr>
<tr>
<td>2. Professionally communicate the requirements, design, and implementation of their computing project</td>
<td>Oral presentation and written report</td>
</tr>
</tbody>
</table>

V. **Guidelines for Evaluation**

A. Project implementation  
B. Employer evaluation  
C. Oral presentation  
D. Written report

VI. **Topical Course Outline**

A. Understand the Computing Needs of the Organization  
   1. Understand the goals and objectives  
   2. Understand the personnel and organization  
   3. Recognize effective and accurate computing practice  
   4. Understand the standards and practices commonly used by the organization  
B. Apply Computing Skills to a Professional Work Setting  
   1. Tailor computing to meet the objectives and follow the standards of the organization and the discipline  
   2. Produce desired work products  
C. Develop a Relationship with the Organization  
   1. Communicate effectively on the job site  
   2. Determine tasks that are needed and that may not have been foreseen by the organization  
   3. Seek and incorporate critical analysis into work  
D. Maintain Appropriate Materials for Evaluation  
   1. Keep log and portfolio of work  
   2. Communicate with faculty liaison and job supervisor on a regular basis  
   3. Work independently within the collaborative framework of the internship  
E. Deliver Final Written Report and Oral Presentation

VII. **Suggested Texts**

An appropriate text will be selected based on the nature of the internship.

VIII. **Bibliography**


Course: Software Engineering
Abbreviated Title for Transcript (30 character): Software Engineering

6. Complete Course Title
   Software Engineering

7. Type of Course
   - Academic
   - Preparatory/Development
   - Non-credit
   - CEU
   - Professional Development

8. Type of Action:
   - Add
   - Change
   - Delete

9. Repeat Status
   - # of Repeats: n/a
   - Max Credits: n/a

10. Grading Basis
    - A-F
    - P/NP
    - NG

11. Implementation Date
    - From: Fall/2013
    - To: 99/9999

13a. Impacted Courses or Programs:

<table>
<thead>
<tr>
<th>Course</th>
<th>Catalog Page(s)</th>
<th>Date of Coordination</th>
<th>Chair/Coordinator Contacted</th>
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</table>

Initiator Name (typed): Kenrick Mock
Initiator Signed Initials: __________ Date: __________

13b. Coordination Email
Date: 12/10/2012
Submitted to Faculty Listserv: uaa-faculty@lists.uaa.alaska.edu

13c. Coordination with Library Liaison
Date: 12/10/2012

15. Course Description (suggested length 20 to 50 words)
Extends the ideas of software design and development from the introductory programming sequence to encompass the problems encountered in large-scale programs. Topics include software lifecycle models for developing large systems, advanced issues in object-oriented programming, design patterns, software development tools, project management principles, and principles of interface design.

16a. Course Prerequisite(s) (list prefix and number)
CSCE A311 with minimum grade of C.

16b. Test Score(s)
   - n/a

16c. Co-requisite(s) (concurrent enrollment required)
   - n/a

16d. Other Restriction(s)
   - College
   - Major
   - Class
   - Level
   - Registration Restriction(s) (non-codable)
   - n/a

17. Mark if course has fees
   - Yes, standard SOE fee

18. Mark if course is a selected topic course
   - No

19. Justification for Action
Revision to establish a course common to both the Computer Science and Computer Systems Engineering programs and update the course content guide.

Initiator (faculty only)

Initiator (TYPE NAME)

Approved
Disapproved

Disapproved
Approved

Department Chairperson

Approved
Disapproved

Board Chairperson

Approved
Disapproved

Provost or Designee

Approved
Disapproved

Dean/Director of School/College

Approved
Disapproved
<table>
<thead>
<tr>
<th>Impacted Program or Course</th>
<th>Type of Impact (course or program)</th>
<th>Catalog Page</th>
<th>Type/Date of Notification</th>
<th>Chair/Coordinator Contacted</th>
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<td>241</td>
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<td>12/1/12</td>
<td>Kenrick Mock</td>
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<td>Prerequisite</td>
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<td>12/1/12</td>
<td>Kenrick Mock</td>
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<tr>
<td>CS A671</td>
<td>Prerequisite Advanced Software Engineering</td>
<td>381</td>
<td>12/1/12</td>
<td>Kenrick Mock</td>
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<td>BSE, Computer Systems Engineering</td>
<td>Program requirement</td>
<td>245</td>
<td>12/1/12</td>
<td>Kenrick Mock</td>
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<tr>
<td>BSE, Computer Systems Engineering Minor</td>
<td>Program requirement</td>
<td>250</td>
<td>12/1/12</td>
<td>Kenrick Mock</td>
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</tbody>
</table>
I.  **Revision Date**: December 1, 2012

II. **Course Information**
   A. **College**: School of Engineering
   B. **Course Subject/Number**: CSCE A401
   C. **Credits**: 3
   D. **Contact Hours**: (3+0) 45 contact lecture hours (3 contact lecture hours/week x 15 weeks = 45) plus 90 hours outside work (6 hours outside work x 15 weeks = 90) for a total of 135 hours
   E. **Course Title**: Software Engineering
   F. **Repeat Status**: No
   G. **Grading Basis**: A-F
   H. **Course Description**: Extends the ideas of software design and development from the introductory programming sequence to encompass the problems encountered in large-scale programs. Topics include software lifecycle models for developing large systems, advanced issues in object-oriented programming, design patterns, software development tools, project management principles, and principles of interface design.
   I. **Course Prerequisites**: CSCE A311 with minimum grade of C.

J. **Fees**: Yes, standard SOE fee

III. **Course Level Justification**

Students must synthesize concepts from 300 level courses to design and develop large-scale programs. This course is typically taught nationwide at the upper division level.

IV. **Instructional Goals and Student Learning Outcomes**

<table>
<thead>
<tr>
<th>A. Instructional Goals.</th>
<th>The instructor will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Introduce students to the theoretical principles of software engineering</td>
</tr>
<tr>
<td>2.</td>
<td>Demonstrate how to integrate software engineering lifecycle models to the development of a software system</td>
</tr>
<tr>
<td>3.</td>
<td>Provide students with an understanding of software quality</td>
</tr>
<tr>
<td>4.</td>
<td>Introduce concepts in effective user interface design</td>
</tr>
<tr>
<td>5.</td>
<td>Demonstrate software engineering tools</td>
</tr>
<tr>
<td>6.</td>
<td>Introduce common software architectures</td>
</tr>
<tr>
<td>7.</td>
<td>Introduce ethical uses of data and information in the development of software systems</td>
</tr>
</tbody>
</table>
B. **Student Learning Outcomes.** Students will be able to:

<table>
<thead>
<tr>
<th></th>
<th>Assessment method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Apply software engineering principles to design software and user interfaces</td>
<td>Project, Assignments, Exams</td>
</tr>
<tr>
<td>2. Utilize a software development lifecycle to design and construct a significant piece of software</td>
<td>Project, Assignments, Exams</td>
</tr>
<tr>
<td>3. Identify the basic techniques that result in efficient and effective ways of building large software systems</td>
<td>Assignments, Exams</td>
</tr>
<tr>
<td>4. Use modern software engineering tools</td>
<td>Project</td>
</tr>
<tr>
<td>5. Assess in a systematic fashion the quality of the interfaces in a range of software systems</td>
<td>Project, Assignments, Exams</td>
</tr>
<tr>
<td>6. Communicate the design and implementation of a software system</td>
<td>Project written report and oral presentation</td>
</tr>
<tr>
<td>7. Identify ethical issues in the development of software systems</td>
<td>Assignments, Exams</td>
</tr>
</tbody>
</table>

V. **Guidelines for Evaluation**

A. Project (written report, oral presentation)
B. Assignments
C. Exams

VI. **Topical Course Outline**

A. Software Lifecycle Models
B. Requirements Engineering
C. Agile Development
   1. Theoretical underpinnings
   2. User stories
   3. Project estimation
   4. Iterations
D. Software Testing
E. Software Development Tools
   1. Version control
   2. Test frameworks
   3. Integrated Development Environments (IDE) and tools
F. Graphical User Interface Design
   1. Norman’s principles of system design
   2. Interface design heuristics
G. Software Architectures
   1. The Unified Modeling Language (UML)
   2. Design patterns
H. Ethical issues
   1. Professional codes of ethics
   2. Case studies
VII. Suggested Texts


VIII. Bibliography


**Course Action Request**

**University of Alaska Anchorage**

**Proposal to Initiate, Add, Change, or Delete a Course**

<table>
<thead>
<tr>
<th>1a. School or College</th>
<th>1b. Division</th>
<th>1c. Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN SOENGR</td>
<td>No Division Code</td>
<td>Computer Science &amp; Engineering</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Course Prefix</th>
<th>3. Course Number</th>
<th>4. Previous Course Prefix &amp; Number</th>
<th>5a. Credits/CEUs</th>
<th>5b. Contact Hours</th>
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<tbody>
<tr>
<td>CSCE</td>
<td>A411</td>
<td>CS A405</td>
<td>3</td>
<td>(Lecture + Lab) (3+0)</td>
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</table>

6. Complete Course Title

Artificial Intelligence

**Abbreviated Title for Transcript (30 character)**

7. Type of Course

- [x] Academic
- [ ] Preparatory/Development
- [ ] Non-credit
- [ ] CEU
- [ ] Professional Development

8. Type of Action:

- [x] Add
- [ ] Change
- [ ] Delete

If a change, mark appropriate boxes:

- [x] Prefix
- [x] Course Number
- [ ] Contact Hours
- [ ] Repeat Status
- [ ] Grading Basis
- [x] Course Prerequisites
- [ ] Cross-Listed/Stacked
- [ ] Registration Restrictions
- [ ] Other Restrictions
  - [ ] Class
  - [ ] Level
  - [ ] College
  - [ ] Major
- [x] Other Course Content Guide (please specify)

9. Repeat Status No

- [ ] # of Repeats
- [ ] Max Credits
- [ ] n/a

10. Grading Basis

- [x] A-F
- [ ] P/NP
- [ ] NG

11. Implementation Date

- [ ] semester/year

- From: Fall/2013
- To: 99/9999

12. Cross Listed with

- [ ] Stacked with

Cross-Listed Coordination Signature

13a. Impacted Courses or Programs:

List any programs or college requirements that require this course.

Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at [www.uaa.alaska.edu/governance](http://www.uaa.alaska.edu/governance).

<table>
<thead>
<tr>
<th>Impacted Program/Course</th>
<th>Catalog Page(s)</th>
<th>Date of Coordination</th>
<th>Chair/Coordinator Contacted</th>
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<tbody>
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<td>12-10-2012</td>
<td></td>
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<td>2.</td>
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<td>3.</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Initiator Name (typed): Frank Moore

Initiator Signed Initials: __________ Date: __________

13b. Coordination Email

Date: 12/10/2012

submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison

Date: 12/10/2012

14. General Education Requirement

Mark appropriate box:

- [ ] Oral Communication
- [ ] Written Communication
- [ ] Quantitative Skills
- [ ] Humanities
- [ ] Fine Arts
- [ ] Social Sciences
- [ ] Natural Sciences
- [ ] Integrative Capstone

15. Course Description (suggested length 20 to 50 words)

Introduction to the basic concepts of Artificial Intelligence (AI). Topics include intelligent agents; heuristic, local, and adversarial search; first-order logic and knowledge representation; and machine learning.

16a. Course Prerequisite(s) (list prefix and number)

CSCE A311 with minimum grade of C.

16b. Test Score(s)

n/a

16c. Co-requisite(s) (concurrent enrollment required)

n/a

16d. Other Restriction(s)

- [ ] College
- [ ] Major
- [ ] Class
- [ ] Level

16e. Registration Restriction(s) (non-codable)

n/a

17. Mark if course has fees Yes, standard SOE fee.

18. Mark if course is a selected topic course

19. Justification for Action

Revision to establish a course common to both the Computer Science and Computer Systems Engineering programs and update the course content guide.

Initiator (faculty only)

Frank Moore

Initiator (TYPE NAME)

[ ] Approved

[ ] Disapproved

Dean/Director of School/College

Date

[ ] Approved

[ ] Disapproved

Undergraduate/Graduate Academic Board Chairperson

Date

[ ] Approved

[ ] Disapproved

Provost or Designee

Date
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<th>COURSE IMPACTS examples: prerequisite, corequisite, recommended</th>
<th>PROGRAM IMPACTS examples: requirement, selective, program credit total</th>
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<th>TYPE/DATE OF NOTIFICATION</th>
<th>CHAIR/COORDINATOR CONTACTED (NOT LISTSERVE)</th>
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<td>12/10/12</td>
<td>Kenrick Mock</td>
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<td>246</td>
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<td>Kenrick Mock</td>
</tr>
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<td>Selective</td>
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Course Content Guide  
University of Alaska Anchorage  
School of Engineering  
Computer Science & Engineering Department

I. Revision Date: December 10, 2012

II. Course Information
A. College: School of Engineering
B. Course Subject/Number: CSCE A411
C. Credits: 3
D. Contact Hours: (3+0) 45 contact lecture hours (3 contact lecture hours/week x 15 weeks = 45) plus 90 hours outside work (6 hours outside lecture/week x 15 weeks = 90) for a total of 135 hours
E. Course Title: Artificial Intelligence
F. Repeat Status: No
G. Grading Basis: A-F
H. Course Description: Introduction to the basic concepts of Artificial Intelligence (AI). Topics include intelligent agents; heuristic, local, and adversarial search; first-order logic and knowledge representation; and machine learning.
I. Course Prerequisites: CSCE A311 with minimum grade of C.
J. Fees: Yes, standard SOE fee

III. Course Level Justification

In this course students will use concepts covered at the 300 level to design, implement, and analyze AI programs.

IV. Instructional Goals and Student Learning Outcomes

<table>
<thead>
<tr>
<th>A. Instructional Goals.</th>
<th>The instructor will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Introduce students to classic artificial intelligence topics, including search, knowledge representation, propositional logic, predicate calculus, and game playing.</td>
</tr>
<tr>
<td>2.</td>
<td>Introduce modern artificial intelligence topics, including knowledge-based systems, machine learning, and genetic/evolutionary computation.</td>
</tr>
<tr>
<td>3.</td>
<td>Develop the students’ abilities to design, implement, test, debug, document, and verify the correct operation of programs that illustrate AI topics.</td>
</tr>
</tbody>
</table>
B. **Student Learning Outcomes.** Students will be able to:

<table>
<thead>
<tr>
<th>Assessment method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Apply AI-based techniques, tools, and languages to solve problems.</td>
</tr>
<tr>
<td>2. Design, implement, test, debug, and verify the correct operation of AI programs.</td>
</tr>
</tbody>
</table>

V. **Guidelines for Evaluation**

A. Assignments  
B. Exams  
C. Projects

VI. **Topical Course Outline**

1. Problems and Searching  
   a. Problems, spaces and search  
   b. Heuristic, local, and adversarial search

2. Knowledge Representation  
   a. Issues  
   b. Predicate calculus and propositional logic  
   c. Uncertainty  
   d. Statistical approaches  
   e. Cognitive approaches

3. Machine Learning  
   a. Bayesian approaches  
   b. Nearest neighbor  
   c. Neural networks  
   d. Evolutionary computation  
   e. Inductive learning  
   f. Classifier systems

4. Application Areas  
   a. Game playing  
   b. Planning  
   c. Natural language processing and text processing  
   d. Expert systems

VII. **Suggested Texts**

VIII. Bibliography

1a. School or College
EN SOENGR

1b. Division
No Division Code

1c. Department
Computer Science &
Engineering

2. Course Prefix
CS

3. Course Number
A412

4. Previous Course Prefix & Number
CS A407

5a. Credits/CEUs
3

5b. Contact Hours
(Lecture + Lab)
(3+0)

6. Complete Course Title
Evolutionary Computing

7. Type of Course
☒ Academic ☐ Preparatory/Development ☐ Non-credit ☐ CEU ☐ Professional Development

8. Type of Action:
☐ Add ☒ Change ☐ Delete

If a change, mark appropriate boxes:
☒ Prefix ☐ Credits ☐ Grade Basis ☐ Title ☐ Repeat Status ☒ Contact Hours ☐ Cross-Listed/Stacked ☒ Course Prerequisites ☒ Co-requisites ☐ Registration Restrictions
☐ Other Restrictions ☐ Class Level ☐ College Major
☐ Other Course Content Guide (please specify)

9. Repeat Status No

# of Repeats
n/a

Max Credits
n/a

10. Grading Basis
☒ A-F ☐ P/NP ☐ NG

11. Implementation Date
semester/year
From: Fall/2013
To: 99/9999

12. ☑ Cross Listed with

Stacked with

Cross-Listed Coordination Signature

13a. Impacted Courses or Programs:
List any programs or college requirements that require this course.
Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at www.uaa.alaska.edu/governance.

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Initiator Name (typed):
Frank Moore
Initiator Signed Initials: __________ Date: __________

13b. Coordination Email
Date: 12/10/2012

submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison
Date: 12/10/2012

14. General Education Requirement
Mark appropriate box:
☐ Oral Communication ☐ Written Communication ☐ Quantitative Skills ☐ Humanities
☐ Fine Arts ☐ Social Sciences ☐ Natural Sciences ☐ Integrative Capstone

15. Course Description (suggested length 20 to 50 words)
Introduces students to subjects in the broad field of evolutionary computing, including genetic algorithms, evolution strategies, evolutionary programming, and genetic programming. Emphasis will be on the design, implementation, testing, debugging, and verification of correct programs.

16a. Course Prerequisite(s) (list prefix and number)
CSCE A311 with minimum grade of C.

16b. Test Score(s)
n/a

16c. Co-requisite(s) (concurrent enrollment required)
n/a

16d. Other Restriction(s)
☑ College ☑ Major ☐ Class ☐ Level

16e. Registration Restriction(s) (non-codable)
n/a

17. ☑ Mark if course has fees Yes, standard SOE fee

18. ☑ Mark if course is a selected topic course

19. Justification for Action
Revision to establish a course common to both the Computer Science and Computer Systems Engineering programs and update the course content guide.

Initiator (faculty only)
Frank Moore
Initiator (TYPE NAME)

Approved ☐ Disapproved ☐ Dean/Director of School/College Date __________

Approved ☐ Disapproved ☐ Undergraduate/Graduate Academic Date __________

Approved ☐ Disapproved ☐ Board Chairperson Date __________

Approved ☐ Disapproved ☐ Provost or Designee Date __________

80
<table>
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<tr>
<th>Impacted Program or Course</th>
<th>Type of Impact (course or program)</th>
<th>Course Impacts examples: prerequisite, corequisite, recommended</th>
<th>Program Impacts examples: requirement, selective, program credit total</th>
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<td>BA/BS Computer Science</td>
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Course Content Guide
University of Alaska Anchorage
School of Engineering
Computer Science & Engineering Department

I. Revision Date: December 10, 2012

II. Course Information
A. College: School of Engineering
B. Course Subject/Number: CSCE A412
C. Credits: 3
D. Contact Hours: (3+0) 45 contact lecture hours (3 contact lecture hours/week x 15 weeks = 45) plus 90 hours outside work (6 hours outside lecture/week x 15 weeks = 90) for a total of 135 hours
E. Course Title: Evolutionary Computing
F. Repeat Status: No
G. Grading Basis: A-F
H. Course Description: Introduces students to subjects in the broad field of evolutionary computing, including genetic algorithms, evolution strategies, evolutionary programming, and genetic programming. Emphasis will be on the design, implementation, testing, debugging, and verification of correct programs.
I. Course Prerequisites: CSCE A311 with minimum grade of C.
J. Fees: Yes, standard SOE fee

III. Course Level Justification

In this course students will use concepts covered at the 300 level to design, implement, and analyze evolutionary programs.

IV. Instructional Goals and Student Learning Outcomes

<table>
<thead>
<tr>
<th>A. Instructional Goals.</th>
<th>The instructor will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Introduce students to the theory and practice of evolutionary computation.</td>
</tr>
<tr>
<td>2.</td>
<td>Impart an appreciation and understanding of how evolutionary techniques can be used to solve, or approximately solve, a wide variety of difficult optimization problems that cannot be solved in a reasonable amount of computing time using traditional methodologies.</td>
</tr>
</tbody>
</table>
B. **Student Learning Outcomes.** Students will be able to:

<table>
<thead>
<tr>
<th></th>
<th>Assessment method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Describe similarities and differences between biological evolution and evolutionary computing.</td>
<td>Exams</td>
</tr>
<tr>
<td>2. Utilize a variety of evolutionary computing techniques, including genetic algorithms, evolution strategies, evolutionary programming, and genetic programming.</td>
<td>Projects</td>
</tr>
<tr>
<td>3. Work with a team member to successfully implement program that employ these evolutionary computing techniques to solve classic non-deterministic polynomial (NP-hard) optimization problems.</td>
<td>Projects</td>
</tr>
<tr>
<td>4. Analyze the results of several program runs for each project and effectively describe relevant conclusions in a written report.</td>
<td>Reports</td>
</tr>
<tr>
<td>5. Design, implement, test, and debug a moderately complex software project.</td>
<td>Major Project</td>
</tr>
<tr>
<td>6. Present project results in a public forum.</td>
<td>Presentation</td>
</tr>
</tbody>
</table>

V. **Guidelines for Evaluation**

A. Exams
B. Major Project
C. Projects
D. Reports
E. Presentations

VI. **Topical Course Outline**

1. Introduction
   a. The evolutionary computing metaphor
   b. Inspiration from biology
   c. Evolutionary computing: why?
2. What is an Evolutionary Algorithm (EA)?
   a. Components of EAs
   b. Applications
   c. Global optimization
3. Genetic Algorithms (GAs)
   a. Representation of individuals in GAs
   b. Mutation and recombination in GAs
   c. GA population models
   d. Parent and survivor selection in GAs
   e. Example applications
   f. Premature convergence and stagnation
4. Evolution Strategies (ES)
a. Representation in ES  
b. Mutation and recombination in ES  
c. Parent and survivor selection in ES  
d. Self-adaptation  
e. Applications of ES  

5. Genetic Programming (GP)  
a. Representation  
b. Mutation and recombination in GP  
c. Selection in GP  
d. Bloat  
e. Applications of GP  

6. Advanced Topics  
a. Classifier systems  
b. Parameter control in EAs  
c. Theory  
   i. The schema theorem  
   ii. The no free lunch theorem  
d. Co-evolution  

VII. Suggested Texts  


VIII. Bibliography  


Course Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Course

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<thead>
<tr>
<th>1a. School or College</th>
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<tbody>
<tr>
<td>1b. Division</td>
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<td>1c. Department</td>
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<td>A431</td>
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<td>4. Previous Course Prefix &amp; Number</td>
<td>CS A431</td>
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<tr>
<td>5a. Credits/CEUs</td>
<td>3</td>
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<tr>
<td>5b. Contact Hours</td>
<td>(Lecture + Lab) (3+0)</td>
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6. Complete Course Title
Compilers

Abbreviated Title for Transcript (30 character)

7. Type of Course
- [x] Academic
- [ ] Preparatory/Development
- [ ] Non-credit
- [ ] CEU
- [ ] Professional Development

8. Type of Action
- [ ] Add
- [x] Change
- [ ] Delete

If a change, mark appropriate boxes:
- [x] Prefix
- [x] Credits
- [x] Title
- [x] Grading Basis
- [x] Course Description
- [ ] Test Score Prerequisites
- [ ] Other Restrictions
- [x] Other Course Content Guide (please specify)

9. Repeat Status No
- [ ] # of Repeats: n/a
- [ ] Max Credits: n/a

10. Grading Basis
- [x] A-F
- [ ] P/NP
- [ ] NG

11. Implementation Date
From: Fall/2013 To: 99/9999

12. Cross Listed with
- [ ] Stacked with

Cross-Listed Coordination Signature

13a. Impacted Courses or Programs:
List any programs or college requirements that require this course.
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</thead>
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<td>12/1/12</td>
<td>Kenrick Mock</td>
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<tr>
<td>2. BA/BS CS, Elective</td>
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<td>Kenrick Mock</td>
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Initiator Name (typed): Jeffrey Miller
Initiator Signed Initials: __________ Date: __________

13b. Coordination Email
Date: 2012-12-15
submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison
Date: 2012-12-15

14. General Education Requirement
Mark appropriate box:
- [ ] Oral Communication
- [ ] Written Communication
- [ ] Quantitative Skills
- [ ] Humanities
- [ ] Fine Arts
- [ ] Social Sciences
- [ ] Natural Sciences
- [ ] Integrative Capstone

15. Course Description (suggested length 20 to 50 words)
Programming language translation from a high-level object-oriented language to assembly code. Lexical analysis, semantic analysis, and code generation. Finite state automata, flow graphs, directed graphs, parsers, parse trees, and regular expressions. Optimizations to improve code efficiency when executed as a low level language.

16a. Course Prerequisite(s) (list prefix and number)
[(CSCE A331 or CSCE A351) and CSCE A248] with minimum grade of C.

16b. Test Score(s)
- [ ] n/a

16c. Co-requisite(s) (concurrent enrollment required)

16d. Other Restriction(s)
- [ ] College
- [ ] Major
- [ ] Class
- [ ] Level

16e. Registration Restriction(s) (non-codable)
- [ ] n/a

17. Mark if course has fees
- [x] Yes, standard SOE fee

18. Mark if course is a selected topic course

19. Justification for Action
Revision to establish a course common to both the Computer Science and Computer Systems Engineering programs and update the course content guide.

Initiator (faculty only)
Jeffrey Miller
Initiator (TYPE NAME)

Approved
Disapproved

Dean/Director of School/College

Approved
Disapproved
Undergraduate/Graduate Academic

Approved
Disapproved
Board Chairperson

Approved
Disapproved
Provost or Designee

Date

85
Course Content Guide
University of Alaska Anchorage
School of Engineering
Department of Computer Science and Engineering

I. Revision Date: November 13, 2012

II. Course Information
A. College: School of Engineering
B. Course Subject/Number: CSCE A431
C. Credits: 3
D. Contact Hours: (3+0) 45 contact lecture hours (3 contact lecture hours/week x 15 weeks = 45) plus 90 hours outside work (6 hours outside lecture/week x 15 weeks = 90) for a total of 135 hours
E. Course Title: Compilers
F. Repeat Status: No
G. Grading Basis: A-F
H. Course Description: Programming language translation from a high-level object-oriented language to assembly code. Lexical analysis, semantic analysis, and code generation. Finite state automata, flow graphs, directed graphs, parsers, parse trees, and regular expressions. Optimizations to improve code efficiency when executed as a low level language.
I. Course Prerequisites: [(CSCE A331 or CSCE A351) and CSCE A248] with minimum grade of C.
J. Fees: Yes, standard SOE fee

III. Course Level Justification

In this course students will use concepts covered at the 300 level to design, implement, and analyze compilers.

IV. Instructional Goals and Student Learning Outcomes

<table>
<thead>
<tr>
<th>A. Instructional Goals</th>
<th>The instructor will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Provide an understanding of lexical analysis of computer programs</td>
<td></td>
</tr>
<tr>
<td>2. Provide an understanding of the differences between context-sensitive and context-free languages</td>
<td></td>
</tr>
<tr>
<td>3. Provide an understanding of semantic language parsing methods</td>
<td></td>
</tr>
<tr>
<td>4. Instill the importance of optimizing programs for added efficiency of programs</td>
<td></td>
</tr>
</tbody>
</table>
B. **Student Learning Outcomes.** Students will be able to:

<table>
<thead>
<tr>
<th></th>
<th>Assessment method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Write a lexical analyzer in a high level language that will handle a given set of language tokens</td>
</tr>
<tr>
<td>2.</td>
<td>Write a parser in a high level language that will generate intermediate code</td>
</tr>
<tr>
<td>3.</td>
<td>Write a code generator in a high level language that will produce assembly code for a given machine architecture</td>
</tr>
</tbody>
</table>

V. **Guidelines for Evaluation**
A. Assignments  
B. Exams  
C. Project

VI. **Topical Course Outline**
1. Introduction, Structure of a Compiler  
2. Syntax-Directed Translator  
3. Lexical Analysis  
4. Strings, Tokens, and Languages  
5. Finite Automata, Nondeterministic Finite State Automata, Deterministic Finite State Automata  
6. Regular Expressions and Grammars  
7. Syntax Analysis  
8. Parse Trees, Ambiguity, Context-Free Grammars  
9. Top-Down, Bottom-Up, Left to Right Leftmost and Rightmost Parsers  
10. Intermediate Code Generators, Three-Address Code  
11. Type Checking, Control Flow  
12. Run-Time Environments, Stacks, Heaps, Garbage Collection  
13. Code Generator, Flow Graphs  
14. Basic Blocks, Optimization of Basic Blocks  
15. Machine-Independent Optimizations  
16. Instruction-Level Parallelism
VII. **Suggested Texts**


VIII. **Bibliography**


Course Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Course

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>1a. School or College</td>
<td>EN SOENGR</td>
<td>1b. Division</td>
<td>No Division Code</td>
<td>1c. Department</td>
</tr>
<tr>
<td>2. Course Prefix</td>
<td>CSCE</td>
<td>3. Course Number</td>
<td>A442</td>
<td>4. Previous Course Prefix &amp; Number</td>
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<tr>
<td>5a. Credits/CEUs</td>
<td>3</td>
<td>5b. Contact Hours</td>
<td>(Lecture + Lab)</td>
<td>(3+0)</td>
</tr>
</tbody>
</table>

6. Complete Course Title
VLSI Circuit Design

7. Type of Course
- [x] Academic
- [ ] Preparatory/Development
- [ ] Non-credit
- [ ] CEU
- [ ] Professional Development

8. Type of Action:
- [ ] Add
- [x] Change
- [ ] Delete

If a change, mark appropriate boxes:
- [x] Prefix
- [x] Credits
- [x] Title
- [x] Grading Basis
- [x] Course Description
- [x] Test Score Prerequisites
- [x] Other Restrictions
- [x] Other Course Content Guide (please specify)

9. Repeat Status No
- [ ] # of Repeats
- [ ] Max Credits

10. Grading Basis
- [x] A-F
- [ ] P/NP
- [ ] NG

11. Implementation Date
- [ ] semester/year
- From: Fall/2013
- To: 99/9999

12. [ ] Cross Listed with
- [ ] Stacked with
- Cross-Listed Coordination Signature

13a. Impacted Courses or Programs: List any programs or college requirements that require this course.
Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at www.uaa.alaska.edu/governance.

<table>
<thead>
<tr>
<th>Impacted Program/Course</th>
<th>Date of Coordination</th>
<th>Chair/Coordinator Contacted</th>
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<tbody>
<tr>
<td>See attached table</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
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<td>3.</td>
<td></td>
<td></td>
</tr>
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Initiator Name (typed): Randy Moulic
Initiator Signed Initials: ________ Date: __________

13b. Coordination Email
- Date: 12-10-12

13c. Coordination with Library Liaison
- Date: 12-10-12

14. General Education Requirement
Mark appropriate box:
- [ ] Oral Communication
- [ ] Written Communication
- [ ] Fine Arts
- [ ] Social Sciences
- [ ] Quantitative Skills
- [ ] Natural Sciences
- [ ] Humanities
- [ ] Integrative Capstone

15. Course Description (suggested length 20 to 50 words)
Analysis and design of digital Very Large Scale Integration (VLSI) circuits including area restrictions, delay minimization, and power minimization. Simulation of VLSI logic in software. Complementary Metal-Oxide Semiconductor (CMOS) design rules, physical design, power consumption, clocking strategies, and transistor theory. Engineering VLSI simulation project at the end of the course.

16a. Course Prerequisite(s) (list prefix and number or test code and score)
(CSCE A342 and EE A204) with minimum grade of C.

16b. Co-requisite(s) (concurrent enrollment required)
N/A

16c. Other Restriction(s)
- [x] College
- [ ] Major
- [ ] Class
- [ ] Level

16d. Registration Restriction(s) (non-codable)
N/A

17. [x] Mark if course has fees Yes, standard SOE fee

18. [ ] Mark if course is a selected topic course

19. Justification for Action
Update course content guide, prefix, and prerequisites.

Initiator (faculty only) Randy Moulic
Initiator (TYPE NAME) ________ Date __________

Approved
Disapproved
Dean/Director of School/College

Undergraduate/Graduate Academic Board Chair

Provost or Designee

Approved
Disapproved
Approved
Disapproved
Approved
Disapproved

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### Courses Being Changed: CSE A442

<table>
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<tr>
<th>Impacted Program or Course</th>
<th>Type of Impact (course or program)</th>
<th>Course Impacts examples: prerequisite, corequisite, recommended</th>
<th>Program Impacts examples: requirement, selective, program credit total</th>
<th>Catalog Page</th>
<th>Type/Date of Notification</th>
<th>Chair/Coordinator Contacted (not listerve)</th>
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<td>245</td>
<td>12/20/12</td>
<td>Kenrick Mock</td>
<td></td>
<td></td>
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<tr>
<td>BSE, Minor Computer Systems Engineering</td>
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<td>12/20/12</td>
<td>Kenrick Mock</td>
<td></td>
<td></td>
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</table>
I. Revision Date: November 29, 2012

II. Course Information
A. College: School of Engineering
B. Course Subject/Number: CSCE A442
C. Credits: 3
D. Contact Hours: 3 + 0
E. Course Title: VLSI Circuit Design
F. Repeat Status: No
G. Grading Basis: A-F
H. Course Description: Analysis and design of digital Very Large Scale Integration (VLSI) circuits including area restrictions, delay minimization, and power minimization. Simulation of VLSI logic in software. Complementary Metal-Oxide Semiconductor (CMOS) design rules, physical design, power consumption, clocking strategies, and transistor theory. Engineering VLSI simulation project at the end of the course.
I. Course Prerequisites: (CSCE A342 and EE A204) with minimum grade of C.
J. Fees: Yes, standard SOE fee
K. Cross-listed: N/A

III. Course Level Justification

The course builds on a previous 300-level course in digital design.

IV. Instructional Goals and Student Learning Outcomes

<table>
<thead>
<tr>
<th>A. Instructional Goals</th>
<th>The instructor will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Explain the current state of CMOS and VLSI work in industry.</td>
</tr>
<tr>
<td>2.</td>
<td>Provide students with the rules for VLSI design.</td>
</tr>
<tr>
<td>3.</td>
<td>Show students how silicon is used in chip layout and design.</td>
</tr>
<tr>
<td>4.</td>
<td>Show by example using simulation tools to test VLSI design before manufacturing chips.</td>
</tr>
</tbody>
</table>
5. Prepare students for a large engineering application using VLSI.

<table>
<thead>
<tr>
<th>B. <strong>Student Learning Outcomes.</strong> Upon completion of this course, students will be able to:</th>
<th>Assessment method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Demonstrate the steps involved in fabrication of CMOS VLSI circuits.</td>
<td>Assignments, Quizzes, Exams, Projects</td>
</tr>
<tr>
<td>2. Apply basic Metal Oxide Semiconductor (MOS) current and voltage equations.</td>
<td>Assignments, Quizzes, Exams, Projects</td>
</tr>
<tr>
<td>3. Use circuit equations to calculate rise/fall times and delays in MOS circuits.</td>
<td>Assignments, Quizzes, Exams, Projects</td>
</tr>
<tr>
<td>4. Develop a methodology for VLSI cell design.</td>
<td>Assignments, Quizzes, Exams, Projects</td>
</tr>
<tr>
<td>5. Design a complex VLSI circuit using material learned in class.</td>
<td>Assignments, Projects</td>
</tr>
<tr>
<td>6. Demonstrate the steps involved in fabrication of CMOS VLSI circuits.</td>
<td>Assignments, Quizzes, Exams, Projects</td>
</tr>
</tbody>
</table>

V. **Guidelines for Evaluation**
A. Assignments  
B. Quizzes  
C. Exams  
D. Projects

VI. **Course Outline**
A. Metal-oxide-semiconductor (MOS) transistors  
B. Complementary metal-oxide-semiconductor (CMOS) fabrication and layout  
C. Current-voltage (I-V) and Capacitance-voltage (C-V) characteristics  
D. Silicon processing  
E. Very Large Scale Integration (VLSI) layout design rules  
F. Delay estimation  
G. Transistor sizing
H. Combinational circuit design
I. Circuit design of latches and flip flops
J. Datapath subsystems and Arithmetic and Logic Units (ALUs)
K. Array subsystems and memory
L. Input/Output and clocks
M. Hardware Definition Languages (HDLs) - Verilog, Very-high-speed integrated circuit (VHSIC) HDL, Verilog Hardware Description Language (VHDL)
N. VLSI engineering application and design

VII. Suggested Texts


VIII. Bibliography

### Course Action Request

**University of Alaska Anchorage**

**Proposal to Initiate, Add, Change, or Delete a Course**

#### 1a. School or College

| EN SOENGR |

#### 1b. Division

| No Division Code |

#### 1c. Department

| Computer Science and Engineering |

#### 2. Course Prefix

| CSCE |

#### 3. Course Number

| A445 |

#### 4. Previous Course Prefix & Number

| CSE A445 |

#### 5a. Credits/CEUs

| 4 |

#### 5b. Contact Hours

| (Lecture + Lab) (3+3) |

#### 6. Complete Course Title

**Computer Design and Simulation**

**Abbreviated Title for Transcript (30 character)**

#### 7. Type of Course

- [ ] Academic
- [ ] Preparatory/Development
- [ ] Non-credit
- [ ] CEU
- [ ] Professional Development

#### 8. Type of Action:

- [ ] Add
- [ ] Change
- [ ] Delete

- [ ] Prefix
- [ ] Credits
- [ ] Title
- [ ] Grading Basis
- [ ] Course Description
- [ ] Test Score Prerequisites
- [ ] Other Restrictions

- [ ] Other Course Content Guide (please specify)

#### 9. Repeat Status No

| # of Repeats | Max Credits |

#### 10. Grading Basis

- [ ] A-F
- [ ] P/NP
- [ ] NG

#### 11. Implementation Date

| semester/year |

From: Fall 2013 To: 99/9999

#### 12. Cross Listed with

| Stacked with |

| Cross-Listed Coordination Signature |

### 13a. Impacted Courses or Programs:

- List any programs or college requirements that require this course.

Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at [www.uaa.alaska.edu/governance](http://www.uaa.alaska.edu/governance).

| Impacted Program/Course | Catalog Page(s) | Date of Coordination | Chair/Coordinator Contacted |

#### 13b. Coordination Email

| Date: 12/1/2012 |

submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

#### 13c. Coordination with Library Liaison

| Date: 12/1/2012 |

#### 14. General Education Requirement

Mark appropriate box:

- [ ] Oral Communication
- [ ] Written Communication
- [ ] Quantitative Skills
- [ ] Humanities
- [ ] Social Sciences
- [ ] Natural Sciences
- [ ] Integrative Capstone

#### 15. Course Description (suggested length 20 to 50 words)

Advanced study through simulation of computer organization including processor, memory and I/O system organization. Key elements include memory hierarchy and caching, computer arithmetic, instruction sets, addressing, interrupts, processor pipelines, I/O interconnection, and memory management including demand paging and Translation Lookaside Buffer (TLB) cache. Students learn metrics used to measure system performance and evaluate engineering tradeoffs made in design.

#### 16a. Course Prerequisite(s) (list prefix and number)

(CSCE A248 and CSCE A311) with minimum grade of C.

| Test Score(s) |

n/a

#### 16b. Test Score(s) |

n/a

#### 16c. Co-requisite(s) (concurrent enrollment required) |

n/a

#### 16d. Other Restriction(s)

- [ ] College
- [ ] Major
- [ ] Class
- [ ] Level

| Registration Restriction(s) (non-codable) |

n/a

#### 16e. Registration Restriction(s) (non-codable) |

n/a

#### 17. Mark if course has fees

Yes, standard SOE fee

#### 18. Mark if course is a selected topic course


#### 19. Justification for Action

Updated course content guide, prerequisites and title to better reflect course description.

---

**Initiator Name (typed):** Sam Siewert

**Initiator Signed Initials:**

| Date: |

---

**Initiator (faculty only):**

| Date: |

---

**Approved**

**Disapproved**

**Dean/Director of School/College**

| Date: |

---

**Approved**

**Disapproved**

**Undergraduate/Graduate Academic**

| Date: |

---

**Approved**

**Disapproved**

**Board Chairperson**

| Date: |

---

**Approved**

**Disapproved**

**Provost or Designee**

| Date: |
UNIVERSITY OF ALASKA ANCHORAGE
COURSE CONTENT GUIDE

I. Initiation Date: December 2012

II. Course Information
A. College/School: School of Engineering
B. Course Title: Computer Design and Simulation
C. Course Subject/Number: CSCE A445
D. Credit Hours: 4.0 Credits
E. Contact Time: 3+3 Contact Time
F. Grading Information: A-F
G. Course Description: This course presents the elements of computer design and computer architecture. Students will study processor, memory and I/O system organization. Key elements include memory hierarchy and cache, computer arithmetic, instruction sets, addressing, interrupts, processor pipelines, I/O interconnection, memory management systems including demand paging and Translation Look-aside Buffer (TLB) cache. Students learn metrics used to measure performance and evaluate engineering tradeoffs made in design.
H. Fees: Yes, standard SOE fee
I. Coordination: SOE and Faculty Listserv
J. Course Prerequisites: (CSCE A248 and CSCE A311) with minimum grade of C.
K. Registration Restrictions: None

III. Evaluation
Grades are based on written examination, class assignments, and projects.

IV. Course Level Justification
This course builds on knowledge of digital hardware, assembly language programming, computer organization, and high level computer programming provided at the 200 and 300 levels.

V. Outline
A. Lecture
   1. Computer Evolution and Performance Metrics
   2. The Computer System Elements
      a. Function and Connections
      b. Internal Memory Systems
      c. External Memory Systems
      d. Input/Output (I/O)
      e. Operating System Support
   3. Central Processing Unit
      a. Computer Arithmetic
      b. Instruction Sets
      c. Addressing
      d. Processor Structure and Function
e. Reduced Instruction Set Computers (RISC)
f. Parallelism and Pipelining

4. Control Unit
   a. Control Unit Operation
   b. Micro-programmed Control (Vertical and Horizontal)

5. Memory System Organizations
   a. Caching
   b. Physical and Virtual Memory
   c. Demand Paging
   d. TLB's

B. Example Projects
   1. Develop functions for the representation of data
   2. Develop a loader used to load the simulated computers memory
   3. Develop a skeletal computer simulation
   4. Implement computer instructions and write a diagnostic program
   5. Develop and add the I/O system to the simulation
   6. Write and debug short assembly language programs and one project
      using the student's computer.

VI. Instructional Goals and Student Learning Outcomes

A. Instructional Goals. The instructor will:
   1. Instill and develop student understanding of the principles of computer design and
      computer architecture.
   2. Explain the engineering tradeoffs required for the design of modern computer systems.
   3. Instruct students on the application of the computer design principles to the simulation of
      a RISC processor.

B. Student Learning Outcomes. Upon completion of this course, students will be able to:

<table>
<thead>
<tr>
<th></th>
<th>Assessment Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Explain the operation of the building blocks of modern computer systems and use metrics to evaluate performance tradeoffs.</td>
<td>exams, quizzes, assignments, class projects</td>
</tr>
<tr>
<td>2. Demonstrate methodologies used in the design of computer systems.</td>
<td>exams, quizzes, assignments, class projects</td>
</tr>
<tr>
<td>3. Create appropriate connections using communication ports between computers.</td>
<td>exams, quizzes, assignments, class projects</td>
</tr>
<tr>
<td>4. Develop the necessary code to complete the course projects.</td>
<td>exams, quizzes, assignments, class projects</td>
</tr>
<tr>
<td>5. Implement course projects, test their operation, and report their findings to the instructor and colleagues.</td>
<td>class projects</td>
</tr>
<tr>
<td>6. Demonstrate recognition of the engineering</td>
<td>exams, quizzes, assignments, class projects</td>
</tr>
</tbody>
</table>
tradeoffs necessary in the design of modern computer systems.

VII. Suggested Texts


VIII. Bibliography and Resources


**Course Action Request**  
University of Alaska Anchorage  
Proposal to Initiate, Add, Change, or Delete a Course

<table>
<thead>
<tr>
<th>1a. School or College</th>
<th>1b. Division</th>
<th>1c. Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN SOENGR</td>
<td>No Division Code</td>
<td>Computer Science &amp; Engineering</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Course Prefix</th>
<th>3. Course Number</th>
<th>4. Previous Course Prefix &amp; Number</th>
<th>5a. Credits/CEUs</th>
<th>5b. Contact Hours (Lecture + Lab)</th>
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<tr>
<td>CSCE</td>
<td>A448</td>
<td>CSE A481</td>
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<td>(3+0)</td>
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6. Complete Course Title  
Computer Architecture

7. Type of Course  
- [x] Academic  
- [ ] Preparatory/Development  
- [ ] Non-credit  
- [ ] CEU  
- [ ] Professional Development

8. Type of Action:  
- [ ] Add  
- [x] Change  
- [ ] Delete

If a change, mark appropriate boxes:

- [x] Prefix  
- [x] Course Number  
- [x] Contact Hours  
- [x] Repeat Status  
- [ ] Title  
- [x] Grading Basis  
- [x] Course Prerequisites  
- [x] Test Score Prerequisites  
- [x] Registration Restrictions  
- [ ] Other Restrictions

9. Repeat Status No  
# of Repeats  
Max Credits

10. Grading Basis  
- [x] A-F  
- [ ] P/NP  
- [ ] NG

11. Implementation Date  
From: Fall/2013  
To: 99/9999

12. Cross Listed with  
- [ ] Stacked with  
- [ ] Cross-Listed Coordination Signature

13a. Impacted Courses or Programs: List any programs or college requirements that require this course.  
Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at [www.uaa.alaska.edu/governance](http://www.uaa.alaska.edu/governance).

<table>
<thead>
<tr>
<th>Impacted Program/Course</th>
<th>Catalog Page(s) Impacted</th>
<th>Date of Coordination</th>
<th>Chair/Coordinator Contacted</th>
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<td>1. BSE CSE program requirement</td>
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<td>12/10/2012</td>
<td>Kenrick Mock</td>
</tr>
<tr>
<td>2. BSE CSE minor</td>
<td></td>
<td>12/10/2012</td>
<td>Kenrick Mock</td>
</tr>
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Initiator Name (typed): Randy Moulic  
Initiator Signed Initials: __________  
Date: __________________

13b. Coordination Email  
Date: 12-10-12  
(submitted to Faculty Listserv: uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison  
Date: 12-10-12

14. General Education Requirement  
Mark appropriate box:  
- [ ] Oral Communication  
- [ ] Written Communication  
- [ ] Quantitative Skills  
- [ ] Humanities  
- [ ] Fine Arts  
- [ ] Social Sciences  
- [ ] Natural Sciences  
- [ ] Integrative Capstone

15. Course Description (suggested length 20 to 50 words)  
A quantitative approach to computer architecture and parallelism, which addresses both the software and hardware aspects of parallelism in modern computing systems. Specific emphasis will be placed on instruction-level, thread level, data-level, task-level, and request-level parallelism, and developing parallel application code in assembler and high-level languages for systems such as Graphics Processing Units (GPUs).

16a. Course Prerequisite(s) (list prefix and number)  
CSCE A248 with a minimum grade of C.

16b. Test Score(s)  
n/a

16c. Co-requisite(s) (concurrent enrollment required)  
n/a

16d. Other Restriction(s)  
- [ ] College  
- [ ] Major  
- [ ] Class  
- [ ] Level  
- [ ] Registration Restriction(s) (non-codable)  
n/a

17. [x] Mark if course has fees Yes, standard SOE fee

18. [ ] Mark if course is a selected topic course

19. Justification for Action  
Revised to establish a course common to both the Computer Science and Computer Systems Engineering programs and update the course content guide. Title updated to more accurately reflect the course content with a corresponding prerequisite of the introductory computer organization course.
<table>
<thead>
<tr>
<th>Initiator (faculty only)</th>
<th>Date</th>
<th>Approved</th>
<th>Disapproved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randy Moulic</td>
<td></td>
<td></td>
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<th>Date</th>
<th>Approved</th>
<th>Disapproved</th>
</tr>
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</table>

<table>
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<th>Dean/Director of School/College</th>
<th>Date</th>
<th>Approved</th>
<th>Disapproved</th>
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<table>
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<tr>
<th>Department Chairperson</th>
<th>Date</th>
<th>Approved</th>
<th>Disapproved</th>
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<table>
<thead>
<tr>
<th>Curriculum Committee Chairperson</th>
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<th>Provost or Designee</th>
<th>Date</th>
<th>Approved</th>
<th>Disapproved</th>
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</thead>
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Course Content Guide
University of Alaska Anchorage
School of Engineering
Department of Computer Science and Engineering

I. Revision Date: December 10, 2012

II. Course Information
A. College: School of Engineering
B. Course Subject/Number: CSCE A448
C. Credits: 3
D. Contact Hours: 3 + 0
E. Course Title: Computer Architecture
F. Repeat Status: No
G. Grading Basis: A-F
H. Course Description: A quantitative approach to computer architecture and parallelism, which addresses both the software and hardware aspects of parallelism in modern computing systems. Specific emphasis will be placed on instruction-level, thread level, data-level, task-level, and request-level parallelism, and developing parallel application code in assembler and high-level languages for systems such as Graphics Processing Units (GPUs).
I. Course Prerequisites: CSCE A248 with minimum grade of C.
J. Fees: Yes, standard SOE fee
K. Cross-listed: N/A

III. Course Level Justification

This course is an advanced course that synthesizes concepts from computer architecture, programming, and algorithms to design and implement parallel computing hardware and software.

IV. Instructional Goals and Student Learning Outcomes

A. Instructional Goals. The instructor will:

1. Guide, and lead students by example in the understanding and use of parallel computation techniques and methodologies; recognizing and identifying Instruction Level Parallelism (ILP), data parallelism, thread level parallelism, and massive, request-level parallelism, and applying the appropriate parallel programming model.
2. Provide students with the necessary skills to write parallel programs in processor specific assembly languages, and parallel enabled high level languages, programming models such as the Open Computing Language (OpenCL), Compute Unified Device Architecture (CUDA), or Message Passing Interface (MPI).

3. Provide a cross-platform, parallel programming development environment and simulator for students to develop, write, test, and debug assembly code.

4. Emphasize both hardware and software aspects and parallelism, the interactions between them, and design optimizations for parallel hardware systems.

5. Expose students to current research challenges in the field, through class lectures and discussions, reading assignments, homework exercises.

6. Aid students in creating algorithms for solving parallel engineering problems, and preparing them for a large engineering application of writing the code executing in a CPU using software development and hybrid-GPU cluster.

B. **Student Learning Outcomes.** Upon completion of this course, students will be able to:

<table>
<thead>
<tr>
<th></th>
<th>Assessment method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Demonstrate an understanding of fundamental principles of parallel system hardware and software architectures.</td>
<td>Assignments, Quizzes, Exams, Projects</td>
</tr>
<tr>
<td>2. Create practical applications of parallel system software and performance optimization.</td>
<td>Assignments, Quizzes, Exams, Projects</td>
</tr>
<tr>
<td>3. Identify, explain and map specific application needs for parallelism to the best-suited parallel system hardware and computing model or models.</td>
<td>Assignments, Quizzes, Exams, Projects</td>
</tr>
<tr>
<td>4. Write, debug, test and run parallel</td>
<td>Assignments, Quizzes,</td>
</tr>
</tbody>
</table>
assembly and high level, parallel enabled languages, exploiting multiple parallel programming models using computer system design software development tools and a hybrid - GPU server cluster.

<table>
<thead>
<tr>
<th>5. Apply learning to design parallel hardware and software solutions.</th>
<th>Exams, Projects</th>
</tr>
</thead>
</table>

**V. Guidelines for Evaluation**

A. Assignments
B. Quizzes
C. Exams
D. Projects

**VI. Course Outline**

A. Quantitative Computer Design & Instruction Set Principles
B. Memory Hierarchy Design and Performance Optimizations
   1. Advanced optimizations for cache performance
   2. Memory technologies and system optimizations
   3. Virtual memory and virtual machines
C. Instruction-Level Parallelism (ILP)
   1. Instruction level parallelism concepts
   2. Compiler techniques for exposing ILP
   3. Branch prediction, data hazards, speculation
   4. ILP in multi issue architectures
D. Data-Level Parallelism in Vector, SIMD and GPU Architectures
   1. Vector co-processor architectures
   2. Single-instruction, multi-data (SIMD) extensions for technical, scientific and multimedia data.
   3. Graphics processing units
   4. Detecting and exploiting loop-level parallelism
   5. Personal computer, Smartphone, tablet GPUs for graphics and numerically intense computing applications.
E. Thread-Level Parallelism
   1. Centralized, shared-memory architectures
   2. Performance of symmetric shared memory multiprocessors
   3. Distributed, shared memory systems
F. Massively parallel, Request-Level Parallelism
   1. Programming models and workloads for massively parallel warehouse-scale systems
2. Physical hardware infrastructure for warehouse servers
3. Improving system application performance using parallelism.
4. Limitations and capabilities of parallelism
5. Amdahl’s law

VII. Suggested Texts


VIII. Bibliography

Course Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Course

1a. School or College  EN SOENGR
1b. Division  No Division Code
1c. Department  Computer Science and Engineering

2. Course Prefix  CSCE   3. Course Number  A465
4. Previous Course Prefix & Number  CSE A465
5a. Credits/CEUs  3
5b. Contact Hours  (Lecture + Lab) (3+0)

6. Complete Course Title  
Computer and Network Security

7. Type of Course  ☒ Academic  ☐ Preparatory/Development  ☐ Non-credit  ☐ CEU  ☐ Professional Development

8. Type of Action:  ☑ Add  ☐ Change  ☐ Delete

9. Repeat Status No  # of Repeats  n/a  Max Credits  n/a

10. Grading Basis  ☒ A-F  ☐ P/NP  ☐ NG

11. Implementation Date  semester/year
From:  Fall/2013  To:  99/9999

12. ☐ Cross Listed with  ☐ Stacked with  ________________

13a. Impacted Courses or Programs:
List any programs or college requirements that require this course.

If a change, mark appropriate boxes:
☒ Prefix  ☐ Credits  ☒ Course Number  ☐ Contact Hours  ☐ Repeat Status
☒ Grading Basis  ☐ Title  ☒ Cross-Listed/Stacked  ☐ Course Prerequisites
☒ Course Description  ☐ Test Score Prerequisites  ☐ Co-requisites
☐ Other Restrictions  ☐ Registration Restrictions
☐ Class  ☐ Level  ☐ College  ☐ Major  ☐ Other Course Content Guide (please specify)

13b. Coordination Email  Date:  12-10-12
submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison  Date:  12-10-12

14. General Education Requirement
Mark appropriate box:
☐ Oral Communication  ☐ Written Communication  ☐ Quantitative Skills  ☐ Humanities
☐ Fine Arts  ☐ Social Sciences  ☐ Natural Sciences  ☐ Integrative Capstone

15. Course Description (suggested length 20 to 50 words)
Analysis of computer and network attack techniques and methods to defend against them including firewalls, virtual private networks; network intrusion detection; and denial of service. Course includes coverage of malware, packet sniffers, wireless networks, cellular networks, and wired networks.

16a. Course Prerequisite(s) (list prefix and number)
CSCE A365 with minimum grade of C.

16b. Test Score(s)
n/a

16c. Co-requisite(s) (concurrent enrollment required)
n/a

16d. Other Restriction(s)
☒ College  ☐ Major  ☐ Class  ☐ Level

16e. Registration Restriction(s) (non-codable)
n/a

17. ☒ Mark if course has fees  Yes, standard SOE fee

18. ☐ Mark if course is a selected topic course

19. Justification for Action
Revision to establish a course common to both the Computer Science and Computer Systems Engineering programs and update the course content guide.

Initiator: Jeffrey Miller
Initiator Signed Initials: ____________ Date: ____________

Curriculum Committee Chairperson  Date  ☐ Approved  ☐ Disapproved
Provost or Designee  Date  ☐ Approved  ☐ Disapproved

Dean/Director of School/College  Date  ☐ Approved  ☐ Disapproved

Undergraduate/Graduate Academic Board Chairperson  Date  ☐ Approved  ☐ Disapproved

Department Chairperson  Date  ☐ Approved  ☐ Disapproved
Course Content Guide
University of Alaska Anchorage
School of Engineering
Department of Computer Science and Engineering

I. Revision Date: November 13, 2012

II. Course Information
A. College: School of Engineering
B. Course Subject/Number: CSCE A465
C. Credits: 3
D. Contact Hours: (3+0) 45 contact lecture hours (3 contact lecture hours/week x 15 weeks = 45) plus 90 hours outside work (6 hours outside lecture/week x 15 weeks = 90) for a total of 135 hours
E. Course Title: Computer and Network Security
F. Repeat Status: No
G. Grading Basis: A-F
H. Course Description: Analysis of computer and network attack techniques and methods to defend against them including firewalls, virtual private networks; network intrusion detection; and denial of service. Course includes coverage of malware, packet sniffers, wireless networks, cellular networks, and wired networks.
I. Course Prerequisites: CSCE A365 with minimum grade of C.
J. Fees: Yes, standard SOE fee

III. Course Level Justification

In this course students will use concepts covered at the 300 level to design, implement, and analyze the security of computer systems and networks.

IV. Instructional Goals and Student Learning Outcomes

<table>
<thead>
<tr>
<th>A. Instructional Goals. The instructor will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Provide an understanding of security problems encountered with computer network system.</td>
</tr>
<tr>
<td>2. Provide an understanding of the how to prevent network security breaches.</td>
</tr>
<tr>
<td>3. Provide a practical level of understanding of how to trace and identify network security threats.</td>
</tr>
<tr>
<td>4. Instill the importance of professionalism in the students and in their interaction with others.</td>
</tr>
</tbody>
</table>
B. **Student Learning Outcomes.** Students will be able to:

<table>
<thead>
<tr>
<th></th>
<th>Assessment method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Identify potential security problems with computer networking systems.</td>
<td>Assignments, Exams, Project</td>
</tr>
<tr>
<td>2. Design security network systems resistant to attack.</td>
<td>Assignments, Exams, Project</td>
</tr>
<tr>
<td>3. Determine the source of network security threats.</td>
<td>Assignments, Exams, Project</td>
</tr>
<tr>
<td>4. Demonstrate professionalism in interactions with colleagues, faculty, and staff.</td>
<td>Assignments, Project</td>
</tr>
</tbody>
</table>

V. **Guidelines for Evaluation**

A. Assignments
B. Exams
C. Project

VI. **Topical Course Outline**

1. Introduction, Network Security Overview
2. Professionalism in Computer and Network Security
3. Types of Security Attacks and Services
4. Symmetric and Asymmetric Encryption
5. Recent Threats and Attacks
6. Kerberos
7. X.509
8. Pretty Good Privacy (PGP)
9. Secure/Multipurpose Internet Mail Extensions (S/MIME)
10. Internet Protocol Security
11. Secure Sockets Layer (SSL)
12. Transport Layer Security (TLS)
14. Wireless and Cellular Security
15. Denial of Service and Distributed Denial of Service (DoS/DDoS)
16. Firewalls
17. Database Security
18. Intrusion Detection and Identification
19. Obfuscation
20. Computer Forensics
21. Anonymity on the Internet (Digital Fingerprints)
22. Legal Implications to Security
VII. **Suggested Texts**


VIII. **Bibliography**

<table>
<thead>
<tr>
<th>1a. School or College</th>
<th>EN SOENGR</th>
</tr>
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<tr>
<td>1b. Division</td>
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<tr>
<td>1c. Department</td>
<td>Computer Science and Engineering</td>
</tr>
<tr>
<td>2. Course Prefix</td>
<td>CSCE</td>
</tr>
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<td>3. Course Number</td>
<td>A470</td>
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<td>4. Previous Course Prefix &amp; Number</td>
<td>CS A470</td>
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<td>5a. Credits/CEUs</td>
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<td>5b. Contact Hours</td>
<td>Lecture + Lab (3+0)</td>
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<tr>
<td>6. Complete Course Title</td>
<td>Computer Science and Engineering Capstone Project</td>
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Abbreviated Title for Transcript (30 character)

| 7. Type of Course | Academic ☒ Preparatory/Development ☐ Non-credit ☐ CEU ☐ Professional Development |

| 8. Type of Action: | ☒ Add ☐ Change ☐ Delete |

If a change, mark appropriate boxes:

- ☒ Prefix
- ☐ Credits
- ☒ Title
- ☐ Contact Hours
- ☐ Repeat Status
- ☑ Grading Basis
- ☖ Cross-Listed/Stacked
- ☖ Course Prerequisites
- ☖ Co-requisites
- ☑ Test Score Prerequisites
- ☖ Registration Restrictions
- ☑ Other Restrictions
- ☑ Class
- ☑ Level
- ☒ College
- ☐ Major
- ☖ Other Course Content Guide (please specify)

| 9. Repeat Status No | # of Repeats | n/a | Max Credits | n/a |

| 10. Grading Basis | ☒ A-F ☐ P/NP ☐ NG |

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<th>11. Implementation Date</th>
<th>semester/year</th>
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<tr>
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| 12. | ☖ Cross Listed with |
|----------------------------------------------|
| ☖ Stacked with Cross-Listed Coordination Signature |

### 13a. Impacted Courses or Programs
List any programs or college requirements that require this course.

Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at [www.uaa.alaska.edu/governance](http://www.uaa.alaska.edu/governance).

<table>
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<th>Impacted Program/Course</th>
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Initiator Name (typed): Kenrick Mock  
Initiator Signed Initials: __________  
Date: ______________

### 13b. Coordination Email
Date: 12/10/2012  
submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

### 13c. Coordination with Library Liaison
Date: 12/10/2012

### 14. General Education Requirement
Mark appropriate box:

- ☒ Oral Communication
- ☐ Written Communication
- ☒ Quantitative Skills
- ☐ Humanities
- ☒ Fine Arts
- ☐ Social Sciences
- ☒ Natural Sciences
- ☒ Integrative Capstone

### 15. Course Description
(suggested length 20 to 50 words)

Application of computer science and computer engineering concepts, principles, and practices to develop a research, applied software development, or computer engineering project. The student will analyze, design, document, implement, and deliver a presentation and written report of a research project or software/hardware system of moderate complexity under the supervision of the instructor and/or other faculty. Includes a discussion of ethical, professional, and contemporary issues in technology and the impact of computing technology in a global and societal context.

### 16a. Course Prerequisite(s) (list prefix and number)
(CSCE A365 and ENGL A212 and (CSCE A351 and CSCE A401) or (CSCE A311 and CSCE A342 and CSCE A448)) with minimum grade of C and (PHIL A305 with a minimum grade of C or concurrent enrollment)

### 16b. Test Score(s)
n/a

### 16c. Co-requisite(s) (concurrent enrollment required)
n/a

### 16d. Other Restriction(s)
☒ College ☐ Major ☒ Class ☐ Level

### 16e. Registration Restriction(s) (non-codable)
Senior Standing and completion of GER Tier 1 (basic college-level skills) courses

### 17. ☒ Mark if course has fees Yes, standard SOE fee

### 18. ☐ Mark if course is a selected topic course

### 19. Justification for Action
Revision to establish a course common to both the Computer Science and Computer Systems Engineering programs and update the course content guide. Description and title updated to allow research projects as the capstone project. Prerequisites updated to ensure that this course should be taken after the required core courses in the CS and CSE programs are completed.
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<tr>
<td>Kenrick Mock</td>
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<tr>
<td>Initiator (TYPE NAME)</td>
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<td>Provost or Designee</td>
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<tr>
<td>Disapproved</td>
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Course Content Guide
University of Alaska Anchorage
School of Engineering
Department of Computer Science and Engineering

I. Revision Date: December 20, 2012

II. Course Information
A. College: School of Engineering
B. Course Subject/Number: CSCE A470
C. Credits: 3
D. Contact Hours: (3+0) 45 contact lecture hours (3 contact lecture hours/week x 15 weeks = 45) plus 90 hours outside work (6 hours outside work x 15 weeks = 90) for a total of 135 hours
E. Course Title: Computer Science and Engineering Capstone Project
F. Repeat Status: No
G. Grading Basis: A-F
H. Course Description: Application of computer science and computer engineering concepts, principles, and practices to develop a research, applied software development, or computer engineering project. The student will analyze, design, document, implement, and deliver a presentation and written report of a research project or software/hardware system of moderate complexity under the supervision of the instructor and/or other faculty. Includes a discussion of ethical, professional, and contemporary issues in technology and the impact of computing technology in a global and societal context.
I. Course Prerequisites: {CSCE A365 and ENGL A212 and [(CSCE A351 and CSCE A401) or (CSCE A311 and CSCE A342 and CSCE A448)]} with minimum grade of C and (PHIL A305 with a minimum grade of C or concurrent enrollment)
J. Fees: Yes, standard SOE fee
K. Course Attributes: GER Integrative Capstone
L. Registration Restrictions: Senior Standing and completion of GER Tier 1 (basic college-level skills) courses

III. Course Level Justification

Students entering this course must have a strong background in core areas of computer science or computer systems engineering to successfully design and implement their own software or hardware system. This knowledge requires completion of a majority of junior-level CSCE courses. In addition, students must have a solid understanding of technical writing (ENGL A212) and communication skills.
IV. Instructional Goals and Student Learning Outcomes

A. Instructional Goals. The instructor will:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Present principles of project management and quality system design.</td>
</tr>
<tr>
<td>2.</td>
<td>Demonstrate the technology project lifecycle to address a real-world problem, including project selection, requirements analysis, design, implementation, writing a final report, and delivering a technical presentation.</td>
</tr>
<tr>
<td>3.</td>
<td>Present principles of user interface design.</td>
</tr>
<tr>
<td>4.</td>
<td>Present effective coding practices for maintainability and efficiency.</td>
</tr>
<tr>
<td>5.</td>
<td>Introduce ethical, professional, and legal issues in computer science.</td>
</tr>
<tr>
<td>6.</td>
<td>Explain the impact of computing technology in a global and societal context.</td>
</tr>
</tbody>
</table>

B. Student Learning Outcomes. Students will be able to:

<table>
<thead>
<tr>
<th></th>
<th>Assessment method</th>
<th>GER Integrative Capstone Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Demonstrate the ability to apply technical, managerial, communications, and interpersonal skills to a realistic project of moderate complexity.</td>
<td>Project, Assignments, Exams</td>
</tr>
<tr>
<td>2.</td>
<td>Synthesize and integrate multiple computing technologies (e.g. object-oriented programming, database design, computer architecture, graphics, etc.) to create a comprehensive hardware/software system or research project.</td>
<td>Project, Assignments, Exams</td>
</tr>
<tr>
<td>3.</td>
<td>Write technical documents and deliver oral presentations to communicate their work.</td>
<td>Project, Assignments</td>
</tr>
<tr>
<td>4.</td>
<td>Identify situations involving professional, ethical, or legal issues and formulate ways to address the situations.</td>
<td>Assignments</td>
</tr>
<tr>
<td>5.</td>
<td>Identify the impact of computing technology to both local and global contexts.</td>
<td>Assignments, Project</td>
</tr>
</tbody>
</table>

V. Guidelines for Evaluation

A. Project (written report, oral presentation)
B. Assignments
C. Exams
VI. **Topical Course Outline**

Many of the following activities are examined in the context of the student’s project.

A. Project Lifecycle Models
   i. Waterfall
   ii. Prototyping
   iii. Agile development
   iv. Project management

B. Requirements Analysis and Design
   i. User-centered design
   ii. User Modeling Language (UML), automata, Entity-Relationship (ER) diagrams

C. Quality Assurance
   i. Testing
   ii. Debugging
   iii. Effective coding practice

D. Graphical User Interface Design
   i. Usability engineering
   ii. Graphical layout
   iii. Human Computer Interaction (HCI)

E. Presentation and Technical Writing Best-Practices

F. Technology and Society
   i. Intellectual Property (IP)
      1. Patents
      2. Trademarks
      3. Trade secrets
      4. Copyright
      5. Plagiarism
      6. Licenses
   ii. Legal issues
   iii. Local and global impact
   iv. Globalization
   v. Ethics
      1. Morals, ethics, laws
      2. Deontological and teleological theories
      3. Ethical decision making process
      4. Professional societies and codes of ethics
      5. Responsible conduct of research
   vi. Privacy and civil liberties
   vii. Computer crime
      1. Exploits
      2. Prevention
VII. **Suggested Texts**


VIII. **Bibliography**


Proposal to Initiate, Add, Change, or Delete a Course

1a. School or College
EN SOENGR

1b. Division
No Division Code

1c. Department
Computer Science and Engineering

2. Course Prefix
CSCE

3. Course Number
A490

4. Previous Course Prefix & Number
CS A490

5a. Credits/CEUs
3

5b. Contact Hours
(Lecture + Lab) (3+0)

6. Complete Course Title
Topics in Computer Science & Computer Systems Engineering
Topics in CS and CSE

7. Type of Course
☑ Academic ☐ Preparatory/Development ☐ Non-credit ☐ CEU ☐ Professional Development

8. Type of Action:
☐ Add ☐ Change ☐ Delete

If a change, mark appropriate boxes:
☑ Prefix ☐ Credits ☐ Grading Basis ☐ Course Number ☐ Contact Hours ☐ Repeat Status ☐ Course Description ☐ Course Prerequisites ☐ Test Score(s) ☐ Co-requisites ☐ Other Restrictions ☐ Registration Restrictions

9. Repeat Status

☐ Yes ☐ No

☐ n/a

Max Credits
n/a

10. Grading Basis
☑ A-F ☐ P/NP ☐ NG

11. Implementation Date
From: Fall/2013 To: 99/9999

12. ☐ Cross Listed with
☑ Stacked with

Cross-Listed Coordination Signature

13a. Impacted Courses or Programs:
List any programs or college requirements that require this course.

Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at www.uaa.alaska.edu/governance.

<table>
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<tr>
<th>Impacted Program/Course</th>
<th>Catalog Page(s)</th>
<th>Date of Coordination</th>
<th>Chair/Coordinator Contacted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. BA and BS, Computer Science</td>
<td>241-242</td>
<td>12/1/12</td>
<td>Kenrick Mock</td>
</tr>
<tr>
<td>2. BSE Computer Systems Engr Selective</td>
<td>245</td>
<td>12/1/12</td>
<td>Kenrick Mock</td>
</tr>
</tbody>
</table>

13b. Coordination Email
Date: 12/10/2012

submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison
Date: 12/10/2012

14. General Education Requirement
Mark appropriate box:

☐ Oral Communication ☐ Written Communication ☐ Quantitative Skills ☐ Humanities

☐ Fine Arts ☐ Social Sciences ☐ Natural Sciences ☐ Integrative Capstone

15. Course Description
(suggested length 20 to 50 words)

Advanced Topics in Computer Science or Computer Systems Engineering not taught in other CSCE course offerings. Special Note: May be repeated for credit with a change of subtitle/topic.

16a. Course Prerequisite(s) (list prefix and number) n/a

16b. Test Score(s) n/a

16c. Co-requisite(s) (concurrent enrollment required) n/a

16d. Other Restriction(s)

Robertson Capstone 16e. Registration Restriction(s) (non-codable)

Instructor approval

17. ☑ Mark if course has fees Yes, standard SOE fee

18. ☑ Mark if course is a selected topic course

19. Justification for Action
Revision to establish a course common to both the Computer Science and Computer Systems Engineering programs and update the course content guide.

Initiator (faculty only)
Kenrick Mock
Initiator (TYPE NAME)

☐ Approved ☐ Disapproved

Department Chairperson Date

☐ Approved ☐ Disapproved

Board Chairperson Date

☐ Approved ☐ Disapproved

Provost or Designee Date

114
Course Content Guide
University of Alaska Anchorage
School of Engineering
Department of Computer Science and Engineering

I. **Revision Date**: December 1, 2012

II. **Course Information**
   A. **College**: School of Engineering
   B. **Course Subject/Number**: CSCE A490
   C. **Credits**: 3
   D. **Contact Hours**: (3+0) 45 contact lecture hours (3 contact lecture hours/week x 15 weeks = 45) plus 90 hours outside work (6 hours outside work x 15 weeks = 90) for a total of 135 hours
   E. **Course Title**: Topics in Computer Science and Computer Systems Engineering
   F. **Repeat Status**: Yes
   G. **Grading Basis**: A-F
   H. **Course Description**: Advanced Topics in Computer Science and Engineering not taught in other CSCE course offerings.
   I. **Course Prerequisites**: None
   J. **Fees**: Yes, standard SOE fee
   K. **Registration Restrictions**: Instructor approval
   L. **Special Topics**: Yes, standard SOE fee

III. **Course Level Justification**

   This course is typically taught nationwide at the senior level as the student is expected to have appropriate expertise and background for a senior-level topics course.

IV. **Instructional Goals and Student Learning Outcomes**

   The instructional goals and student outcomes will vary depending upon the course taught. An example from “Computer Graphics and Machine Vision” follows.

<table>
<thead>
<tr>
<th>A. <strong>Instructional Goals</strong></th>
<th>The instructor will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Instill and develop student understanding of both machine and computer vision</td>
</tr>
<tr>
<td>2.</td>
<td>Instruct students on the use of computer and machine vision algorithms</td>
</tr>
</tbody>
</table>
B. **Student Learning Outcomes.** Students will be able to:

<table>
<thead>
<tr>
<th></th>
<th>Assessment method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Explain the implementation and use of machine and computer vision for automation and interaction</td>
</tr>
<tr>
<td>2.</td>
<td>Demonstrate methodologies used in the design of machine vision systems</td>
</tr>
<tr>
<td>3.</td>
<td>Demonstrate methodologies used in the design of machine vision systems</td>
</tr>
<tr>
<td>4.</td>
<td>Develop the necessary code to complete the course projects</td>
</tr>
<tr>
<td>5.</td>
<td>Implement course projects, test their operation, and report their findings to the instructor and colleagues</td>
</tr>
<tr>
<td>6.</td>
<td>Demonstrate recognition of the engineering tradeoffs necessary in the design of production machine vision systems</td>
</tr>
</tbody>
</table>

V. **Guidelines for Evaluation**

Because this is a selected topics course, the exact focus of the course may vary depending on the topic addressed. However, in general, the course will involve a combination of:

A. Discussion  
B. Lecture  
C. Exams  
D. Quizzes  
E. Projects  
F. Homework Assignments

VI. **Topical Course Outline**

The course outline will vary with the topic. A sample from “Computer Graphics and Machine Vision” follows.

A. Computer and Machine Vision History  
B. Image Capture and Processing  
C. Edge Detection  
D. Shape Analysis and Detection  
E. Extracting 3D Models from Scenes  
F. Real-time Pattern Recognition  
G. Computer Vision Fundamentals  
H. Interactive Applications  
I. MATLAB® and Open Computer Vision (OpenCV)
VII. **Suggested Texts**

The texts will vary with the topic. A sample from “Computer Graphics and Machine Vision” follows.


VIII. **Bibliography**

The bibliography will vary with the topic. A sample from “Computer Graphics and Machine Vision” follows.

Course Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Course

<table>
<thead>
<tr>
<th>1a. School or College</th>
<th>1b. Division</th>
<th>1c. Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN SOENGR</td>
<td>No Division Code</td>
<td>Computer Science and Engineering</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Course Prefix</th>
<th>3. Course Number</th>
<th>4. Previous Course Prefix &amp; Number</th>
<th>5a. Credits/CEUs</th>
<th>5b. Contact Hours (Lecture + Lab)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCE</td>
<td>A495</td>
<td>CS A495</td>
<td>3</td>
<td>(0+9)</td>
</tr>
</tbody>
</table>

6. Complete Course Title
Computing Internship Project
Abbreviated Title for Transcript (30 character)

7. Type of Course
- [ ] Academic
- [ ] Preparatory/Development
- [ ] Non-credit
- [ ] CEU
- [ ] Professional Development

8. Type of Action:
- [ ] Add
- [ ] Change
- [ ] Delete

If a change, mark appropriate boxes:
- [ ] Prefix
- [ ] Course Number
- [ ] Credits
- [ ] Contact Hours
- [ ] Repeat Status
- [ ] Title
- [ ] Course Prerequisites
- [ ] Course Description
- [ ] Cross-Listed/Stacked
- [ ] Test Score Prerequisites
- [ ] Co-requisites
- [ ] Other Restrictions
  - [ ] Class
  - [ ] Level
  - [ ] College
  - [ ] Major
- [ ] Other Course Content Guide (please specify)

9. Repeat Status
- [ ] Yes
- [ ] # of Repeats
- [ ] Max Credits

10. Grading Basis
- [ ] A-F
- [ ] P/NP
- [ ] NG

11. Implementation Date
From: Fall/2013 To: 99/9999

12. [ ] Cross Listed with
[ ] Stacked with
Cross-Listed Coordination Signature

13a. Impacted Courses or Programs: List any programs or college requirements that require this course.

<table>
<thead>
<tr>
<th>Impacted Program/Course</th>
<th>Catalog Page(s) Impacted</th>
<th>Date of Coordination</th>
<th>Chair/Coordinator Contacted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. CS BA and BS</td>
<td>241-242</td>
<td>11/26/12</td>
<td>Kenrick Mock</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
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<td>3.</td>
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<td></td>
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</table>

Initiator Name (typed): Kenrick Mock
Initiator Signed Initials: _________ Date: ______________

13b. Coordination Email
Date: 12/10/2012
submitted to Faculty Listserv: (aar-faculty@lists.aar.alaska.edu)

13c. Coordination with Library Liaison
Date: 12/10/2012

14. General Education Requirement
Mark appropriate box:
- [ ] Oral Communication
- [ ] Written Communication
- [ ] Quantitative Skills
- [ ] Humanities
- [ ] Fine Arts
- [ ] Social Sciences
- [ ] Natural Sciences
- [ ] Integrative Capstone

15. Course Description (suggested length 20 to 50 words)
Application of computer science or computer engineering skills in a professional work setting. The student will analyze, design, develop, and document a realistic computing project of moderate complexity under the supervision of a qualified professional who has agreed in advance to undertake this role. Special Note: May be taken up to three times, but only 3 credits may be applied toward CS or CSE major requirements.

16a. Course Prerequisite(s) (list prefix and number)
CSCE A311 with minimum grade of C.

16b. Test Score(s)
- [ ] n/a

16c. Co-requisite(s) (concurrent enrollment required)
- [ ] n/a

16d. Other Restriction(s)
- [ ] College
- [ ] Major
- [ ] Class
- [ ] Level

16e. Registration Restriction(s) (non-codable)
Instructor approval

17. [ ] Mark if course has fees Yes, standard SOE fee

18. [ ] Mark if course is a selected topic course

19. Justification for Action
Revision to establish a course common to both the Computer Science and Computer Systems Engineering programs and update the course content guide. Purposefully no longer satisfies the CS (not GER) capstone requirement. Students must enroll in CSCE A470 to complete the CS capstone which includes ethics, SW Development, professional development, and user interface material. Students can still use a qualifying project with an employer as their capstone project in CSCE A470.
<table>
<thead>
<tr>
<th>Initiator (faculty only)</th>
<th>Date</th>
<th>Approve</th>
<th>Disapprove</th>
<th>Dean/Director of School/College</th>
<th>Date</th>
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<tbody>
<tr>
<td>Kenrick Mock</td>
<td></td>
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<table>
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<th>Date</th>
<th>Approve</th>
<th>Disapprove</th>
<th>Undergraduate/Graduate Academic Board Chairperson</th>
<th>Date</th>
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<table>
<thead>
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<th>Curriculum Committee Chairperson</th>
<th>Date</th>
<th>Approve</th>
<th>Disapprove</th>
<th>Provost or Designee</th>
<th>Date</th>
</tr>
</thead>
<tbody>
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<td></td>
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<tr>
<td>Disapproved</td>
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</tbody>
</table>
Course Content Guide  
University of Alaska Anchorage  
School of Engineering  
Department of Computer Science and Engineering

I. Revision Date: December 12, 2012

II. Course Information
A. College: School of Engineering
B. Course Subject/Number: CSCE A495
C. Credits: 3
D. Contact Hours: (0+9) 0 contact lecture hours plus 135 hours outside work (9 hours outside work x 15 weeks = 135) for a total of 135 hours
E. Course Title: Internship in Computing
F. Repeat Status: Yes, up to 9 credits
G. Grading Basis: P/NP
H. Course Description: Application of computer science or computer engineering skills in a professional work setting. The student will analyze, design, develop, and document a realistic computing project of moderate complexity under the supervision of a qualified professional who has agreed in advance to undertake this role. Special Note: May be taken up to three times, but only 3 credits may be applied toward CS or CSE major requirements.
I. Course Prerequisites: CSCE A311 with minimum grade of C.
J. Fees: Yes, standard SOE fee
K. Registration Restrictions: Instructor approval

III. Course Level Justification

This course is designed to give senior computer science or computer systems engineering major an opportunity to apply computing skills in a professional work setting. The student spends the semester at a job site with a field supervisor providing assignments and a faculty liaison oversees the scope and quality of the work. The student is required to have knowledge of data structures and algorithms before enrolling in the course to ensure programming competency. Students placed into this course must have a project that includes analysis, design, development, and documentation of a project of moderate complexity.

IV. Instructional Goals and Student Learning Outcomes

<table>
<thead>
<tr>
<th>A. Instructional Goals.</th>
<th>The instructor will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Provide students with professional work experience in the field of computing.</td>
<td></td>
</tr>
</tbody>
</table>
B. **Student Learning Outcomes.** Students will be able to:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Assessment method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Apply acquired computing skills in a professional work setting consistent with the background of the student</td>
<td>Project implementation, Employer Evaluation</td>
</tr>
<tr>
<td>2.</td>
<td>Professionally communicate the requirements, design, and implementation of their computing project</td>
<td>Oral presentation and written report</td>
</tr>
<tr>
<td>3.</td>
<td>Synthesize and integrate systems analysis, systems design, system implementation, and documentation of a computing project</td>
<td>Project implementation, Employer Evaluation, oral presentation, written report</td>
</tr>
</tbody>
</table>

V. **Guidelines for Evaluation**
A. Project implementation
B. Employer evaluation
C. Oral presentation
D. Written report

VI. **Topical Course Outline**
A. Understand the Computing Needs of the Organization
   1. Understand the goals and objectives
   2. Understand the personnel and organization
   3. Recognize effective and accurate computing practice
   4. Understand the standards and practices commonly used by the organization
B. Apply Computing Skills to a Professional Work Setting
   1. Tailor computing to meet the objectives and follow the standards of the organization and the discipline
   2. Produce desired work products
C. Develop a Relationship with the Organization
   1. Communicate effectively on the job site
   2. Determine tasks that are needed and that may not have been foreseen by the organization
   3. Seek and incorporate critical analysis into work
D. Project Lifecycle
   1. Systems analysis and requirements
   2. Systems design
   3. Implementation
   4. Testing
   5. Documentation
   6. Maintenance
E. Maintain Appropriate Materials for Evaluation
   1. Keep log and portfolio of work
   2. Communicate with faculty liaison and job supervisor on a regular basis
   3. Work independently within the collaborative framework of the internship
F. Deliver Final Written Report and Oral Presentation
VII. **Suggested Texts**

An appropriate text will be selected based on the nature of the internship.

VIII. **Bibliography**


### Course Action Request

#### University of Alaska Anchorage

**Proposal to Initiate, Add, Change, or Delete a Course**

<table>
<thead>
<tr>
<th>1a. School or College</th>
<th>1b. Division</th>
<th>1c. Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN SOENGR</td>
<td>No Division Code</td>
<td>Computer Science &amp; Engineering</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Course Prefix</th>
<th>3. Course Number</th>
<th>4. Previous Course Prefix &amp; Number</th>
<th>5a. Credits/CEUs</th>
<th>5b. Contact Hours (Lecture + Lab)</th>
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<tbody>
<tr>
<td>CSCE</td>
<td>A498</td>
<td>CS A498</td>
<td>1-3</td>
<td>(1-3+0)</td>
</tr>
</tbody>
</table>

#### 6. Complete Course Title

**Individual Research**

**Abbreviated Title for Transcript (30 character)**

- **Type of Course**: Academic
- **Type of Action**: Add
- **Repeat Status**: Yes
- **Grading Basis**: A-F
- **Implementation Date**: From: Fall/2013 To: 99/9999
- **Cross Listed with**: 
- **Stacked with**: 

**Course Description**

Students will engage in an independent research project under the supervision of a faculty member. The result will be a paper or presentation prepared to publication standards. Special note: May be repeated up to a maximum of 6 credits.

**Course Prerequisite(s)**

- n/a

**Test Score(s)**

- n/a

**Co-requisite(s)**

- n/a

**Registration Restrictions**

- n/a

**Other Course Content Guide (please specify)**

- n/a

**General Education Requirement**

- Oral Communication
- Written Communication
- Quantitative Skills
- Humanities
- Fine Arts
- Social Sciences
- Natural Sciences
- Integrative Capstone

**Other Restriction(s)**

- College
- Major
- Class
- Level

**Co-requisite(s) (concurrent enrollment required)**

- n/a

**Registration Restriction(s) (non-codable)**

- Upper division standing and instructor permission.

**Mark if course has fees Yes, standard SOE fee**

- n/a

**Mark if course is a selected topic course**

- n/a

**Initiator Name (typed): Frank Moore**

**Initiator Signed Initials:** 

**Date:** 

**Initiator (faculty only)**

- Approved
- Disapproved

**Dean/Director of School/College**

- Approved
- Disapproved

**Undergraduate/Graduate Academic Board Chairperson**

- Approved
- Disapproved

**Provost or Designee**

- Approved
- Disapproved

**Mark if course has fees Yes, standard SOE fee**

- n/a

**Mark if course is a selected topic course**

- n/a

**Date:**

**Curriculum Committee Chairperson**

- Approved
- Disapproved
Course Content Guide
University of Alaska Anchorage
School of Engineering
Department of Computer Science and Engineering

I. Revision Date: December 10, 2012

II. Course Information
A. College: School of Engineering
B. Course Subject/Number: CSCE A498
C. Credits: 1-3
D. Contact Hours: (1-3 + 0)
E. Course Title: Individual Research
F. Repeat Status: Yes
G. Grading Basis: A-F
H. Course Description: Students will engage in an independent research project under the supervision of a faculty member. The result will be a paper or presentation prepared to publication standards. Special note: May be repeated up to a maximum of 6 credits.
I. Course Prerequisites: Upper division standing and instructor permission.
J. Fees: Yes, standard SOE fee
K. Cross-listed: No

III. Course Level Justification

The course requires understanding of fundamental concepts in computer science or computer engineering. Selected upper division courses may also be necessary depending upon the nature of the research.

IV. Instructional Goals and Student Learning Outcomes

A. Instructional Goals. The instructor will:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Present topics of current research to students.</td>
</tr>
<tr>
<td>2.</td>
<td>Teach students about the nature of computing research.</td>
</tr>
<tr>
<td>3.</td>
<td>Teach students about scientific research methods.</td>
</tr>
<tr>
<td>4.</td>
<td>Provide students with the opportunity to perform original research in applied or theoretical computing.</td>
</tr>
<tr>
<td>5.</td>
<td>Teach students how to present at a conference or publish in a journal.</td>
</tr>
</tbody>
</table>

B. Student Learning Outcomes. Students will be able to:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Discuss topics of current research.</td>
</tr>
<tr>
<td></td>
<td>Assessment method</td>
</tr>
<tr>
<td></td>
<td>Project Proposal, Project, Final Report</td>
</tr>
</tbody>
</table>
2. Utilize scientific literature and resources. Project Proposal, Project, Final Report

3. Apply the scientific method by conducting original research in computing. Project, Final Report

4. Utilize design, development, and analysis skills to conduct original research in computing. Project, Final Report

5. Deliver a research presentation. Presentation

6. Complete a technical paper prepared to publication standards. Technical Paper

V. Guidelines for Evaluation

A. Project Proposal
B. Project
C. Final Report
D. Presentation
E. Technical Paper

VI. Topical Course Outline

This course involves independent research under the direction of a faculty supervisor. Topics researched will vary.

VII. Suggested Texts

None.

VIII. Bibliography

The bibliography will depend upon the selected research topic.
### Course Action Request

**University of Alaska Anchorage**

**Proposal to Initiate, Add, Change, or Delete a Course**

<table>
<thead>
<tr>
<th>1a. School or College</th>
<th>1b. Division</th>
<th>1c. Department</th>
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<tbody>
<tr>
<td>MA Mat-SU</td>
<td>No Division Code</td>
<td>n/a</td>
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<table>
<thead>
<tr>
<th>2. Course Prefix</th>
<th>3. Course Number</th>
<th>4. Previous Course Prefix &amp; Number</th>
<th>5a. Credits/CEUs</th>
<th>5b. Contact Hours (Lecture + Lab)</th>
</tr>
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<tbody>
<tr>
<td>RE</td>
<td>A100</td>
<td></td>
<td>3</td>
<td>(3+0)</td>
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</table>

6. **Complete Course Title**

**Introduction to Sustainable Energy**

**Intro Sustainable Energy**

**Abbreviated Title for Transcript (30 character)**

7. **Type of Course**

- Academic
- Preparatory/Development
- Non-credit
- CEU
- Professional Development

8. **Type of Action:**

- [ ] Add
- [ ] Change
- [ ] Delete

9. **Repeat Status No # of Repeats Max Credits**

10. **Grading Basis**

- [x] A-F
- [ ] P/NP
- [ ] NG

11. **Implementation Date**

- semester/year
- From: FALL /2013
- To: /9999

12. **Cross Listed with**

- [ ] Stacked with

13a. **Impacted Courses or Programs:** List any programs or college requirements that require this course.

Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at [www.uaa.alaska.edu/governance](http://www.uaa.alaska.edu/governance).

<table>
<thead>
<tr>
<th>Impacted Program/Course</th>
<th>Date of Coordination</th>
<th>Chair/Coordinator Contacted</th>
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<td>Sustainable Energy</td>
<td>02/11/2013</td>
<td>Mark Masteller</td>
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<td>Occupational Endorsement Certificate</td>
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13b. **Coordination Email**

- Date: 02/08/2013
- submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. **Coordination with Library Liaison**

- Date: 02/14/2013

14. **General Education Requirement**

<table>
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<tr>
<th>Mark appropriate box:</th>
<th>Oral Communication</th>
<th>Written Communication</th>
<th>Quantitative Skills</th>
<th>Humanities</th>
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<tbody>
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</tbody>
</table>

15. **Course Description (suggested length 20 to 50 words)**

Introduces students to the field of sustainable energy. Topics include current energy use, principles of energy conservation and efficiency, renewable energy resources, technologies, storage and hardware options, regulations, applicable codes, and career pathways.

16a. **Course Prerequisite(s) (list prefix and number or test code and score)**

- None

16b. **Co-requisite(s) (concurrent enrollment required)**

- n/a

16c. **Other Restriction(s)**

| [ ] College | [ ] Major | [ ] Class | [ ] Level |

16d. **Registration Restriction(s) (non-codable)**

- n/a

17. [ ] Mark if course has fees

18. [ ] Mark if course is a selected topic course

19. **Justification for Action**

Align core program course title with new certificate title that more accurately reflects program content including energy conservation/efficiency and renewable energy production.

---

**Initiator (faculty only) Mark Masteller**

<table>
<thead>
<tr>
<th>Initiator (TYPE NAME)</th>
<th>Date</th>
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<tbody>
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**Dean/Director of School/College**

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**Undergraduate/Graduate Academic**

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**Board Chair**

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<tr>
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**Provost or Designee**

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<th>Date</th>
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<tbody>
<tr>
<td>[ ] Disapproved</td>
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</tbody>
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126
I. **Initiation Date:** February 2013

II. **Course Information**
   A. **College:** Mat-Su College
   B. **Course Prefix:** RE – Renewable Energy
   C. **Course Number:** RE A100
   D. **Credit Hours:** 3.0 (3+0) Contact Time
   E. **Course Title:** Introduction to Sustainable Energy
   F. **Grading Basis:** A-F
   G. **Implementation Date:** Fall 2013
   H. **Cross Listing:** Not applicable
   I. **Stacking:** Not applicable
   J. **Course Description:**
      Introduces students to the field of sustainable energy. Topics include current energy use, principles of energy conservation and efficiency, renewable energy resources, technologies, storage and hardware options, regulations, applicable codes, and career pathways.
   K. **Course Attributes:** Not applicable
   L. **Course Prerequisites/Other Restrictions**
      i. **Prerequisites:** None
      ii. **Registration Restrictions:** None
   M. **Course/Lab Fees:** No

III. **Course Level Justification**
    Introduces the field of knowledge related to current energy use, energy conservation/efficiency, and renewable energy production. Includes vocabulary, fundamental concepts, and skills required to pursue employment and further training in the sustainable energy field. No previous knowledge or experience is necessary.

IV. **Instructional Goals and Student Learning Outcomes**
   A. The instructor will:
      - Introduce the principles, technical requirements, and applications of solar, wind, hydro, geothermal and thermal energy, and energy storage
      - Introduce the concepts and principles of energy conservation and efficiency
      - Introduce standardized vocabulary and terminology
      - Introduce the legislative framework surrounding small- and large-scale renewable energy systems, including local codes and laws governing the construction and operation of systems
      - Introduce the different career pathways in the field of sustainable energy resources (planning, permits, design, construction, maintenance, and operations)
B. Defined Student Learning Outcomes. Student will be able to:

<table>
<thead>
<tr>
<th>Student Learning Outcomes</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrate understanding of the principles, technical requirements, and applications of solar, wind, hydro, geothermal and thermal energy, and energy storage</td>
<td>Quizzes, exams, class discussions, and written assignments</td>
</tr>
<tr>
<td>Identify the concepts and principles of energy conservation and efficiency</td>
<td>Quizzes, exams, class discussions, written assignments, and presentations</td>
</tr>
<tr>
<td>Use standardized vocabulary and terminology</td>
<td>Quizzes, exams, and reports</td>
</tr>
<tr>
<td>Demonstrate understanding of the legislative framework surrounding small- and large-scale renewable energy systems, including local codes and laws governing the construction and operation of systems</td>
<td>Exams, class discussions, and written assignments</td>
</tr>
<tr>
<td>Explore the different career pathways in the field of sustainable energy resources (planning, permits, design, construction, maintenance, and operations)</td>
<td>Exams, class discussions, and projects</td>
</tr>
</tbody>
</table>

V. Evaluation/Assessment Methods
Various assessment tools can be used at the instructor’s discretion including quizzes, homework, in-class presentations, class participation, independent projects, and exams.

VI. Suggested Course Outline

A. Introduction to Sustainable Energy
   1. Types of renewable energy systems
   2. Energy applications (electricity and heat)
   3. Renewable energy resources
   4. Energy science basics

B. Energy Conservation and Efficiency
   1. Design considerations and audits
   2. Calculating energy losses, gains, and overall efficiency
   3. Building efficiency overview

C. Inverters and Rectifiers
   1. Principles of AC and DC electricity
   2. Inverter principles and application
   3. Principles of DC voltage regulation

D. Energy Storage
   1. Principles of energy storage
   2. Operation, configuration, and maintenance of battery systems
   3. Safety issues with batteries

E. Photovoltaic (PV) Electricity Generation
   1. Solar resource assessment
   2. Principles of PV technology
   3. PV module installation and operation
   4. System configuration and limitations
F. Wind Electricity Generation
   1. Resource assessment
   2. Turbine components and configuration
   3. Turbine rating
   4. System installation, operation, and limitations

G. Hydropower Electricity Generation
   1. Resource assessment
   2. Run-of-river and dam-based systems
   3. Turbine types
   4. Penstock design, transmission, and construction
   5. Diversion loads
   6. System operation, limitations, and configuration

H. Geothermal Energy
   1. Resource assessment – high temperature and low temperature
   2. Power plant configuration for high- and low-temperature sources
   3. Re injection requirements
   4. System operation, limitations, and outlook

I. Heating with Renewable Energy
   1. Principles of heat transfer
   2. Principles of passive and active space and water heating

J. Legal Framework
   1. Overview of federal legislation
   2. Overview of state legislation
   3. Permit requirements for construction and operation
   4. Current initiatives

K. Employment Considerations
   1. Political, social, and economic considerations
   2. Overview of duties, skills, and responsibilities
   3. Legal aspects of the profession

VII. Suggested Text


VIII. Bibliography and Resources


1a. School or College  
MA Mat-SU  
1b. Division  
No Division Code  
1c. Department  
n/a

2. Course Prefix  
RE  
3. Course Number  
A102  
4. Previous Course Prefix & Number  
5a. Credits/CEUs  
3  
5b. Contact Hours (Lecture + Lab)  
(3+0)

6. Complete Course Title  
Applied Physics for Sustainable Energy  
Appl Physics Sustain Energy  
Abbreviated Title for Transcript (30 character)

7. Type of Course  
Academic

8. Type of Action:  
☐ Add or ☒ Change or ☐ Delete

If a change, mark appropriate boxes:
☐ Prefix  
☐ Credits  
☒ Title  
☐ Grading Basis  
☐ Cross-Listed/Stacked
☐ Course Description  
☐ Test Score Prerequisites  
☐ Co-requisites
☐ Registration Restrictions
☐ Class  
☐ College  
☐ Major  
☐ Level  
☐ Repeat Status  
☐ Repeat Status  
☐ Contact Hours  
☐ Credit/CEUs  
☐ Title

9. Repeat Status No  
☐ # of Repeats  
☐ Max Credits

10. Grading Basis  
☒ A-F  
☐ P/NP  
☐ NG

11. Implementation Date  
semester/year

From:  FALL /2013  
To:  /9999

12. ☐ Cross Listed with  
Stacked with  
Cross-Listed Coordination Signature

13a. Impacted Courses or Programs:  
List any programs or college requirements that require this course.

Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at www.uaa.alaska.edu/governance.

<table>
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<th>Impacted Program/ Course</th>
<th>Date of Coordination</th>
<th>Chair/Coordinator Contacted</th>
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</thead>
<tbody>
<tr>
<td>Sustainable Energy Occupational Endorsement Certificate</td>
<td>02/11/2013</td>
<td>Mark Masteller</td>
</tr>
</tbody>
</table>

13b. Coordination Email  
Date: 02/08/2013  
submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison  
Date: 02/14/2013

14. General Education Requirement  
Mark appropriate box:
☐ Oral Communication  
☐ Written Communication  
☐ Quantitative Skills  
☐ Humanities  
☐ Fine Arts  
☐ Social Sciences  
☐ Natural Sciences  
☐ Integrative Capstone

15. Course Description (suggested length 20 to 50 words)  
Introductory course for students considering a career in sustainable energy. Includes the physical principles for energy efficiency and various renewable energy technologies including solar, wind, hydropower, and geothermal. Demonstrates how the principles of physics relate to the design, basic operation, advantages, and limitations of sustainable energy projects.

16a. Course Prerequisite(s) (list prefix and number or test code and score)  
RE A100 or concurrent enrollment

16b. Co-requisite(s) (concurrent enrollment required)

16c. Other Restriction(s)  
☐ College  ☐ Major  ☐ Class  ☐ Level

16d. Registration Restriction(s) (non-codable)  
Placement into MATH A055 or higher

17. ☐ Mark if course has fees

18. ☐ Mark if course is a selected topic course

19. Justification for Action  
Align course title with revised certificate title that more accurately reflects program content including energy conservation/efficiency and renewable energy production.

Initiator (faculty only)  
Mark Masteller

Initiator (TYPE NAME)  
☐ Approved  
☐ Disapproved

Dean/Director of School/College  
Date

Undergraduate/Graduate Academic  
Date

Board Chair  
Date

Provost or Designee  
Date

131
I. Initiation Date: February 2013

II. Course Information
A. College: Mat-Su College
B. Course Prefix: RE – Renewable Energy
C. Course Number: RE A102
D. Credit Hours: 3.0 (3+0) Contact Time
E. Course Title: Applied Physics for Sustainable Energy
F. Grading Basis: A-F
G. Implementation Date: Fall 2013
H. Cross Listing: Not applicable
I. Stacking: Not applicable
J. Course Description: Introductory course for students considering a career in sustainable energy. Includes the physical principles for energy efficiency and various renewable energy technologies including solar, wind, hydropower, and geothermal. Demonstrates how the principles of physics relate to the design, basic operation, advantages, and limitations of sustainable energy projects.
K. Course Attributes: Not applicable
L. Course Prerequisites/Other Restrictions
   i. Prerequisites: RE A100 or concurrent enrollment
   ii. Registration Restrictions: Placement into MATH A055 or higher
M. Course/Lab Fees: No

III. Course Level Justification
Introduces the vocabulary, physical laws, and underlying concepts of systems required in the sustainable energy field.

IV. Instructional Goals and Student Learning Outcomes
A. The instructor will:
   • Introduce applicable terminology relating to the physical laws of sustainable energy
   • Introduce the basic laws of physics that apply to sustainable energy systems
   • Introduce the mechanical and electrical principles required to understand sustainable energy systems
   • Explain the laws of physics as applied to the production and control of electrical energy systems
B. Defined Student Learning Outcomes. Student will be able to:

<table>
<thead>
<tr>
<th>Student Learning Outcomes</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define terminology relating to the physical laws of sustainable energy</td>
<td>Quizzes, class discussions, and exams</td>
</tr>
<tr>
<td>Identify the basic laws of physics that apply to sustainable energy</td>
<td>Quizzes, class discussions, written assignments, and exams</td>
</tr>
<tr>
<td>Describe the mechanical and electrical principles required to understand sustainable energy systems</td>
<td>Quizzes, class discussions, and written assignments</td>
</tr>
<tr>
<td>Explain the laws of physics as applied to the production and control of electrical energy systems</td>
<td>Quizzes, class discussions, written assignments, and exams</td>
</tr>
</tbody>
</table>

V. Evaluation/Assessment Methods
Various assessment tools can be used at the instructor’s discretion including quizzes, homework, in-class presentations, class participation, independent projects, and exams.

VI. Suggested Course Outline

A. Matter and Molecules
   1. Bohr’s Law
   2. Physical properties
   3. Mass and weight
   4. Heat vs. temperature
      a. Molecular movement
      b. Applications to thermal storage
   5. Changes of state

B. Newton’s Laws
   1. The First Law of Motion
   2. The Second Law of Motion
   3. The Third Law of Motion
   4. Applications to sustainable energy

C. Forms of Energy Used in Sustainable Energy Technologies
   1. Chemical
      a. Combustion
      b. Batteries
      c. Biochemical
   2. Mechanical
   3. Thermal
   4. Radiant
   5. Electrical

D. Thermodynamics of Sustainable Energy
   1. Law of Conservation of Energy
   2. Energy conversions
   3. Conversion efficiencies
   4. Perfect-Gas Law
   5. Examples of thermodynamic processes in sustainable energy
E. Basic Electricity Concepts
   1. Electron movement
   2. Bohr’s Theory of Atomic Structure
   3. Energy forms causing electron movement
   4. Complete circuits
   5. Series and parallel circuits
   6. Conductors, semi-conductors, and insulators
   7. Voltage, current, resistance, and power
   8. Ohm’s Law and The Power Law
   9. DC and AC
F. Use of Magnetism in Sustainable Energy
   1. Natural and artificial magnets
   2. Magnetic polarity
   3. Electromagnets
   4. Left Hand Rule for a conductor
   5. Left Hand Rule for a coil
   6. Sustainable energy applications for electromagnetic devices
G. Magnetoelectric Effect
   1. Electrical generation by magnetism
   2. Electrical waveforms
   3. Left Hand Rule for a generator
   4. Generators vs. alternators
   5. Transformers
H. Photovoltaic (PV)
   1. PN junctions
   2. PV cell construction
   3. The PV array
I. Electrical Safety
   1. Factors affecting current flow through the body
   2. Effects of current flow through the body
   3. Hazardous working conditions and equipment safety in sustainable energy technologies
   4. Grounding
   5. Emergency response for electrical injury
J. Phase Shift and Power Factor
   1. Capacitive circuits
   2. Inductive circuits
   3. Power factor correction

VII. Suggested Text


VIII. Bibliography and Resources


**Course Action Request**  
University of Alaska Anchorage  
Proposal to Initiate, Add, Change, or Delete a Course

1a. School or College  
MA Mat-SU  

1b. Division  
No Division Code  

1c. Department  
n/a  

2. Course Prefix  
RE  

3. Course Number  
A110  

4. Previous Course Prefix & Number  
RE A194A  

5a. Credits/CEUs  
1  

5b. Contact Hours  
(Lecture + Lab)  
(1+0)  

6. Complete Course Title  
Introduction to Solar Photovoltaic Systems  
Intro Solar PV Systems  

7. Type of Course  
[ ] Academic  
[ ] Preparatory/Development  
[ ] Non-credit  
[ ] CEU  
[ ] Professional Development  

8. Type of Action:  
[ ] Add  
[ ] Change  
[ ] Delete  

If a change, mark appropriate boxes:  
[ ] Prefix  
[ ] Credits  
[ ] Title  
[ ] Grading Basis  
[ ] Course Description  
[ ] Test Score Prerequisites  
[ ] Other Restrictions  
[ ] Class  
[ ] Level  
[ ] College  
[ ] Major  
[ ] Other (please specify)  

9. Repeat Status No  
[ ] # of Repeats  
[ ] Max Credits  

10. Grading Basis  
[ ] A-F  
[ ] P/NP  
[ ] NG  

11. Implementation Date  
[ ] semester/year  
From: FALL /2013  
To: /9999  

12. Cross Listed with  
[ ] Stacked with  
Cross-Listed Coordination Signature  

13a. Impacted Courses or Programs: List any programs or college requirements that require this course.  
Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at www.uaa.alaska.edu/governance.  

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<td>3.</td>
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13b. Coordination Email  
Date: 02/08/2013  
submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)  

13c. Coordination with Library Liaison  
Date: 01/31/2013  

14. General Education Requirement  
Mark appropriate box:  
[ ] Oral Communication  
[ ] Written Communication  
[ ] Quantitative Skills  
[ ] Humanities  
[ ] Fine Arts  
[ ] Social Sciences  
[ ] Natural Sciences  
[ ] Integrative Capstone  

15. Course Description (suggested length 20 to 50 words)  
Presents basics of design and installation of solar photovoltaic (PV) systems with an emphasis on residential-scale systems. Introduces physics related to solar energy, ways of harvesting solar energy, sizing a PV system, energy storage vs. grid-tie, system components, installation options, cost/benefit considerations, and safety.  

16a. Course Prerequisite(s) (list prefix and number or test code and score)  
None  

16b. Co-requisite(s) (concurrent enrollment required)  
n/a  

16c. Other Restriction(s)  
[ ] College  
[ ] Major  
[ ] Class  
[ ] Level  

16d. Registration Restriction(s) (non-codable)  
n/a  

17. [ ] Mark if course has fees  

18. [ ] Mark if course is a selected topic course  

19. Justification for Action  
To change this course to permanent status.  

Initiator (faculty only)  
Mark Masteller  
Initiator (TYPE NAME)  

[ ] Approved  
[ ] Disapproved  

Dean/Director of School/College  
Date  

[ ] Approved  
[ ] Disapproved  

Undergraduate/Graduate Academic  
Date  

[ ] Approved  
[ ] Disapproved  

Board Chair  
Date  

[ ] Approved  
[ ] Disapproved  

Provost or Designee  
Date  

[ ] Approved  
[ ] Disapproved  

Department Chair  
Date  

[ ] Approved  
[ ] Disapproved  

College/School Curriculum Committee Chair  
Date  

136
I. Initiation Date: January 2013

II. Course Information
A. College: Mat-Su College
B. Course Prefix: RE – Renewable Energy
C. Course Number: RE A110
D. Credit Hours: 1.0 (1+0) Contact Time
E. Course Title: Introduction to Solar Photovoltaic Systems
F. Grading Basis: A-F
G. Implementation Date: Fall 2013
H. Cross Listing: Not applicable
I. Stacking: Not applicable
J. Course Description:
   Presents basics of design and installation of solar photovoltaic (PV) systems with an emphasis on residential-scale systems. Introduces physics related to solar energy, ways of harvesting solar energy, sizing a PV system, energy storage vs. grid-tie, system components, installation options, cost/benefit considerations, and safety.

K. Course Attributes: Not applicable
L. Course Prerequisites/Other Restrictions
   i. Prerequisites: None
   ii. Registration Restrictions: None
M. Course/Lab Fees: No

III. Course Level Justification
Provides basic knowledge of solar photovoltaic systems.

IV. Instructional Goals and Student Learning Outcomes
A. Instructional Goals.
   This course introduces vocabulary, fundamental concepts, and skills related to the design, installation, and operation of residential-scale solar photovoltaic systems. The instructor will:
   • Present an overview of residential-scale solar PV systems, including Alaskan case studies, and explain their components and functions
   • Provide opportunities for students to demonstrate and defend how they would make decisions regarding development, design, and installation of solar PV systems given financial restraints and other practical considerations
   • Introduce operation, maintenance, and safety considerations of residential solar PV systems
B. Defined Student Learning Outcomes. Student will be able to:

<table>
<thead>
<tr>
<th>Student Learning Outcomes</th>
<th>Measures</th>
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<tbody>
<tr>
<td>Describe the components and their functions of stand-alone and grid-tied photovoltaic systems</td>
<td>Quizzes, class participation, exams</td>
</tr>
<tr>
<td>Compare the benefits and costs of PV systems for use in specific locations</td>
<td>Quizzes, class participation, homework</td>
</tr>
<tr>
<td>Explain the relationship of energy efficiency measures and PV system development</td>
<td>Quizzes, class participation, exams</td>
</tr>
<tr>
<td>Describe the general design and installation considerations important when considering a residential PV system</td>
<td>Demonstrations, quizzes</td>
</tr>
<tr>
<td>Discuss PV system operation, maintenance, and safety considerations</td>
<td>Quizzes, class participation, exams</td>
</tr>
</tbody>
</table>

V. Evaluation/Assessment Methods
Various assessment tools can be used at the instructor’s discretion including quizzes, homework, in-class presentations, class participation, independent projects, and exams.

VI. Suggested Course Outline
This course can be delivered in a variety of ways but will typically be delivered as a 5-week course in concert with other 1-credit courses offered in the Occupational Endorsement program. It can also be delivered as a weekend intensive course to accommodate both traditional and non-traditional students and to allow for off-site delivery.

A. Overview of Photovoltaics (PV)
   1. History of the development and use of photovoltaics
   2. Current and emerging opportunities in PV
   3. Advantages/disadvantages of PV technology
   4. PV system types and general components
B. Photovoltaic Electric Principles
   1. Terminology
   2. Electric circuits – series and parallel circuits in power sources and loads
C. The Solar Resource
   1. Solar radiation fundamentals
   2. Site analysis for PV
D. Electric Load Analysis
   1. Energy efficiency and cost/benefit considerations
   2. Electric load requirements
   3. Load estimate calculation and special considerations
E. PV Modules
   1. PV principles
   2. Module types and performance
   3. PV arrays
   4. Mounting systems for modules and arrays
F. Battery Systems
   1. Battery types, operation, and specifications
   2. Battery maintenance and safety
   3. Battery sizing considerations and wiring configurations

G. PV Controls and Inverters
   1. Controller types and features; considerations for specifying a controller
   2. Inverter operating principles, features, and types
   3. Inverter selection

H. PV System Wiring
   1. Wire sizing and overcurrent protection
   2. Disconnects and grounding

I. Sizing PV Systems
   1. Basic sizing considerations, design penalties, and cost/benefit considerations
   2. Sizing worksheet and sample exercise

J. Integrating PV with Utility Systems
   1. System sizing and economics
   2. Net-metering and local interconnection policies

K. PV System Applications and Building Integration
   1. Lighting, water pumping, refrigeration
   2. Hybrid systems with generators
   3. Building-integrated PV options and considerations

L. System Installation, Operation, Maintenance, and Safety
   1. Preparation for installation: site, tools, and materials
   2. Installation of PV array, controller, and inverter
   3. PV system wiring
   4. Maintenance of PV components and appliances; troubleshooting common problems
   5. Hazards, basic safety, site considerations, and safety equipment

VII. Suggested Text


VIII. Bibliography and Resources


**Course Action Request**

University of Alaska Anchorage

Proposal to Initiate, Add, Change, or Delete a Course

---

1a. School or College  
MA Mat-SU

1b. Division  
No Division Code

1c. Department  
n/a

2. Course Prefix  
RE

3. Course Number  
A120

4. Previous Course Prefix & Number  
RE A194B

5a. Credits/CEUs  
1

5b. Contact Hours  
(Lecture + Lab) (1+0)

6. Complete Course Title  
Introduction to Solar Thermal Hot Water Systems

7. Type of Course  
☑ Academic  ☐ Preparatory/Development  ☐ Non-credit  ☐ CEU  ☐ Professional Development

8. Type of Action:  
☐ Add  ☐ Change  ☐ Delete

9. Repeat Status No  
# of Repeats  
Max Credits

10. Grading Basis  
☑ A-F  ☐ P/NP  ☐ NG

11. Implementation Date  
semester/year  
From: FALL /2013  
To: /9999

12. Cross Listed with  
☐ Stacked with  
Cross-Listed Coordination Signature

13a. Impacted Courses or Programs:  
List any programs or college requirements that require this course.

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<td>Mark Masteller</td>
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<td>3.</td>
<td></td>
</tr>
</tbody>
</table>

Initiator Name (typed): Mark Masteller  
Initiator Signed Initials: _________  
Date: __________

13b. Coordination Email  
Date: 02/08/2013  
submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison  
Date: 01/31/2013

14. General Education Requirement  
Mark appropriate box:  
☑ Oral Communication  ☐ Written Communication  ☐ Quantitative Skills  ☐ Humanities  
☐ Fine Arts  ☐ Social Sciences  ☐ Natural Sciences  ☐ Integrative Capstone

15. Course Description (suggested length 20 to 50 words)  
Presents basics of design and installation of solar thermal hot water systems with emphasis on residential-scale systems. Introduces physics related to solar thermal energy, ways of harvesting solar energy, sizing solar thermal systems, and uses in domestic hot water and space heat applications. Includes energy storage, system components, installation techniques, cost/benefit considerations, and safety.

16a. Course Prerequisite(s) (list prefix and number or test code and score)  
None

16b. Co-requisite(s) (concurrent enrollment required)  
n/a

16c. Other Restriction(s)  
☐ College  ☐ Major  ☐ Class  ☐ Level

16d. Registration Restriction(s) (non-codable)  
n/a

17. Mark if course has fees

18. Mark if course is a selected topic course

19. Justification for Action  
To change this course to permanent status.

---

Initiator (faculty only)  
Mark Masteller  
Initiator (TYPE NAME)

☐ Approved  
☐ Disapproved  
Dean/Director of School/College  
Date

☐ Approved  
☐ Disapproved  
Department Chair  
Date

☐ Approved  
☐ Disapproved  
Undergraduate/Graduate Academic  
Date

☐ Approved  
☐ Disapproved  
Board Chair  
Date

☐ Approved  
☐ Disapproved  
Provost or Designee  
Date
I. Initiation Date: January 2013

II. Course Information
A. College: Mat-Su College
B. Course Prefix: RE – Renewable Energy
C. Course Number: RE A120
D. Credit Hours: 1.0 (1+0) Contact Time
E. Course Title: Introduction to Solar Hot Water Systems
F. Grading Basis: A-F
G. Implementation Date: FALL 2013
H. Cross Listing: Not applicable
I. Stacking: Not applicable
J. Course Description:
   Presents basics of design and installation of solar hot water systems with emphasis on residential-scale systems. Introduces physics related to solar thermal energy, ways of harvesting solar energy, sizing solar hot water systems, and uses in domestic hot water and space heat applications. Includes energy storage, system components, installation techniques, cost/benefit considerations, and safety.
K. Course Attributes: Not Applicable
L. Course Prerequisites/Other Restrictions:
   i. Prerequisites: None
   ii. Registration Restrictions: None
M. Course/Lab Fees: No

III. Course Level Justification
Provides basic knowledge of solar hot water systems.

IV. Instructional Goals and Student Learning Outcomes
A. Instructional Goals.
Introduces students to the vocabulary, fundamental concepts, and skills related to the design, installation, and operation of residential-scale solar hot water systems. The instructor will:
   • Present an overview of residential-scale solar hot water systems, including Alaskan case studies, and explain their components and functions
   • Provide opportunities for students to demonstrate and defend how they would make decisions regarding development, design, and installation of solar hot water systems given financial restraints and other practical considerations
   • Introduce operation, maintenance, and safety considerations of residential solar hot water systems
B. Defined Student Learning Outcomes. Student will be able to:

<table>
<thead>
<tr>
<th>Student Learning Outcomes</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe the components and their functions in common solar hot water (SHW) systems</td>
<td>Quizzes, class participation, exams</td>
</tr>
<tr>
<td>Compare the benefits and costs of SHW systems for use in specific locations</td>
<td>Quizzes, class participation, homework</td>
</tr>
<tr>
<td>Explain the relationship of energy efficiency measures and SHW system development</td>
<td>Quizzes, class participation, exams</td>
</tr>
<tr>
<td>Describe the general design and installation considerations for residential-scale SHW systems</td>
<td>Class participation, exams</td>
</tr>
<tr>
<td>Discuss SHW system operation, maintenance, and safety considerations</td>
<td>Quizzes, class participation, exams</td>
</tr>
</tbody>
</table>

V. Evaluation/Assessment Methods
Various assessment tools can be used at the instructor’s discretion including quizzes, homework, in-class presentations, class participation, independent projects, and exams.

VI. Suggested Course Outline
This course can be delivered in a variety of ways but will typically be delivered as a 5-week course in concert with other 1-credit courses offered in the Occupational Endorsement program. It can also be delivered as a weekend intensive course to accommodate both traditional and non-traditional students and allow for off-site delivery.

A. Overview and History of Solar Hot Water (SHW) Heating
B. Economics of SHW
   1. Life cycle cost: comparing systems
   2. General cost/benefit considerations related to efficiency and SHW systems
C. Types of SHW Collectors
   1. Flat plate, evacuated tube, and other collectors
   2. Comparison of collectors
D. Other System Components
   1. Storage tanks
   2. Heat exchangers
   3. Pumps, piping, and pipe insulation
   4. Solar fluids
   5. Other components
E. Types of SHW Systems
   1. Pressurized antifreeze systems
   2. Drainback systems
   3. Integral collector storage systems
   4. Thermosiphon systems
   5. Open-loop and draindown systems
   6. Refrigerant solar water heaters
F. Solar Space Heating Systems
   1. Liquid-type solar heating systems
a. With storage
b. Without storage
2. Heat delivery methods
3. High-mass systems
4. Air-type solar heating systems

G. Selecting the Site

H. Sizing the System
1. Solar water heating system
2. Solar space heating system
3. Air heating systems
4. Other system components

I. System Installation, Operation, and Maintenance
1. Solar collectors and heat exchangers: handling and mounting
2. System plumbing and testing
3. Routine system operation and maintenance
4. Controls and power sources

J. Safety
1. Site safety
2. Hazard recognition
3. Basic codes

VII. Suggested Text

VIII. Bibliography and Resources


**Course Action Request**

**University of Alaska Anchorage**

Proposal to Initiate, Add, Change, or Delete a Course

<table>
<thead>
<tr>
<th>1a. School or College</th>
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<th>1c. Department</th>
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<td>MA Mat-SU</td>
<td>No Division Code</td>
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<tr>
<th>2. Course Prefix</th>
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<td>RE</td>
<td>A130</td>
<td>RE A194C</td>
<td>1</td>
<td>(1+0)</td>
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</table>

**6. Complete Course Title**

Introduction to Small Wind Systems

Intro Small Wind Systems

Abbreviated Title for Transcript (30 character)

**7. Type of Course**

☑ Academic ☐ Preparatory/Development ☐ Non-credit ☐ CEU ☐ Professional Development

**8. Type of Action:** ☐ Add or ☑ Change or ☐ Delete

If a change, mark appropriate boxes:

- ☐ Prefix
- ☑ Course Number
- ☐ Credits
- ☐ Title
- ☐ Grading Basis
- ☐ Contact Hours
- ☐ Repeat Status
- ☐ Course Description
- ☐ Cross-Listed/Stacked
- ☐ Test Score Prerequisites
- ☐ Co-requisites
- ☐ Other Restrictions
- ☐ Registration Restrictions

Class ☐ Level ☐ College ☐ Major ☐ (please specify)

**9. Repeat Status No # of Repeats Max Credits**

**10. Grading Basis** ☑ A-F ☐ P/NP ☐ NG

**11. Implementation Date** semester/year

From: FALL /2013 To: /9999

**12. Cross Listed with**

Stacked with Cross-Listed Coordination Signature

**13a. Impacted Courses or Programs:** List any programs or college requirements that require this course.

Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at [www.uaa.alaska.edu/governance](http://www.uaa.alaska.edu/governance).

**Impacted Program/Course**

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<tbody>
<tr>
<td>02/11/2013</td>
<td>Mark Masteller</td>
</tr>
</tbody>
</table>

**13b. Coordination Email**

Date: 02/08/2013

submitted to Faculty Listserv: [uaa-faculty@lists.uaa.alaska.edu](mailto:uaa-faculty@lists.uaa.alaska.edu)

**13c. Coordination with Library Liaison**

Date: 01/31/2013

**14. General Education Requirement**

Mark appropriate box:

- ☐ Oral Communication
- ☐ Written Communication
- ☐ Quantitative Skills
- ☐ Humanities
- ☐ Fine Arts
- ☐ Social Sciences
- ☐ Natural Sciences
- ☐ Integrative Capstone

**15. Course Description (suggested length 20 to 50 words)**

Presents basics of the design, installation, and operation of small wind systems with an emphasis on residential-scale systems. Introduces physics related to wind energy, ways of harvesting and using wind energy, turbine and site selection, energy storage vs. grid-tie considerations, system components, installation techniques, cost/benefit considerations, and safety.

**16a. Course Prerequisite(s) (list prefix and number or test code and score)**

None

**16b. Co-requisite(s) (concurrent enrollment required)**

n/a

**16c. Other Restriction(s)**

☐ College ☐ Major ☐ Class ☐ Level

**16d. Registration Restriction(s) (non-codable)**

n/a

**17. Mark if course has fees**

☐

**18. Mark if course is a selected topic course**

☐

**19. Justification for Action**

To change this course to permanent status.

**Initiator (faculty only)**

Mark Masteller

Initiator Signed Initials: __________________________ Date: __________________

**10. Grading Basis**

☑ A-F ☐ P/NP ☐ NG

**11. Implementation Date** semester/year

From: FALL /2013 To: /9999

**12. Cross Listed with**

Stacked with Cross-Listed Coordination Signature

**13a. Impacted Courses or Programs:** List any programs or college requirements that require this course.

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**13b. Coordination Email**

Date: 02/08/2013

submitted to Faculty Listserv: [uaa-faculty@lists.uaa.alaska.edu](mailto:uaa-faculty@lists.uaa.alaska.edu)

**13c. Coordination with Library Liaison**

Date: 01/31/2013

**14. General Education Requirement**

Mark appropriate box:

- ☐ Oral Communication
- ☐ Written Communication
- ☐ Quantitative Skills
- ☐ Humanities
- ☐ Fine Arts
- ☐ Social Sciences
- ☐ Natural Sciences
- ☐ Integrative Capstone

**15. Course Description (suggested length 20 to 50 words)**

Presents basics of the design, installation, and operation of small wind systems with an emphasis on residential-scale systems. Introduces physics related to wind energy, ways of harvesting and using wind energy, turbine and site selection, energy storage vs. grid-tie considerations, system components, installation techniques, cost/benefit considerations, and safety.

**16a. Course Prerequisite(s) (list prefix and number or test code and score)**

None

**16b. Co-requisite(s) (concurrent enrollment required)**

n/a

**16c. Other Restriction(s)**

☐ College ☐ Major ☐ Class ☐ Level

**16d. Registration Restriction(s) (non-codable)**

n/a

**17. Mark if course has fees**

☐

**18. Mark if course is a selected topic course**

☐

**19. Justification for Action**

To change this course to permanent status.

**Initiator (faculty only)**

Mark Masteller

Initiator Signed Initials: __________________________ Date: __________________
UNIVERSITY OF ALASKA ANCHORAGE
COURSE CONTENT GUIDE

I. Initiation Date: January 2013

II. Course Information
A. College: Mat-Su College
B. Course Prefix: RE – Renewable Energy
C. Course Number: RE A130
D. Credit Hours: 1.0 (1+0) Contact Time
E. Course Title: Introduction to Small Wind Systems
F. Grading Basis: A-F
G. Implementation Date: Fall 2013
H. Cross Listing: Not applicable
I. Stacking: Not applicable
J. Course Description:
   Presents basics of the design, installation, and operation of small wind
   systems with an emphasis on residential-scale systems. Introduces physics related
   to wind energy, ways of harvesting and using wind energy, turbine and site
   selection, energy storage vs. grid-tie considerations, system components,
   installation techniques, cost/benefit considerations, and safety.

K. Course Attributes: Not Applicable
L. Course Prerequisites/Other Restrictions
   i. Prerequisites: None
   ii. Registration Restrictions: None
M. Course/Lab Fees: None

III. Course Level Justification
Provides basic knowledge of residential-scale wind energy systems.

IV. Instructional Goals and Student Learning Outcomes
   A. Instructional Goals.
Introduces students to the vocabulary, fundamental concepts, and skills related to the
   design, installation, and operation of residential-scale wind energy systems. The
   instructor will:
   • Present an overview of residential-scale wind systems, including Alaskan case
     studies, and explain their components and functions
   • Provide opportunities for students to demonstrate and defend how they would
     make decisions regarding development, design, and installation of small wind
     systems given financial restraints and other practical considerations
   • Introduce operation, maintenance, and safety considerations of residential wind
     systems
B. Defined Student Learning Outcomes. Student will be able to:

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<th>Student Learning Outcomes</th>
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<tbody>
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<td>Describe small wind energy system components and their functions</td>
<td>Quizzes, class participation, exams</td>
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<tr>
<td>Compare the benefits and costs of small wind systems for use in specific locations</td>
<td>Quizzes, class participation, homework</td>
</tr>
<tr>
<td>Explain the relationship of energy efficiency measures and wind system development</td>
<td>Quizzes, class participation, exams</td>
</tr>
<tr>
<td>Describe general design, installation considerations, and procedures when setting up a small wind system</td>
<td>Class participation, individual projects, exams</td>
</tr>
<tr>
<td>Discuss wind system operation, maintenance, and safety</td>
<td>Quizzes, class participation, exams</td>
</tr>
</tbody>
</table>

V. Evaluation/Assessment Methods
Various assessment tools can be used at the instructor’s discretion including quizzes, homework, in-class presentations, class participation, independent projects, and exams.

VI. Suggested Course Outline
This course can be delivered in a variety of ways but will typically be delivered as a 5-week course in concert with other 1-credit courses offered in the Occupational Endorsement program. It can also be delivered as a weekend intensive course to accommodate both traditional and non-traditional students and allow for off-site delivery.

A. Overview of Wind Energy
   1. History and recent trends
   2. Relationship to fossil fuel use and climate change

B. Basic Technology
   1. Rotor orientation
   2. Blade configuration and materials
   3. Overspeed control
   4. Generators and drive trains
   5. Turbine types: horizontal- and vertical-axis turbines
   6. Classes of turbines: micro, mini, residential, small- and large-commercial
   7. Towers

C. Wind Energy Basics
   1. Power in wind
   2. Swept area
   3. Wind speed distribution: measuring the wind resource

D. Economic Considerations
   1. Cost of energy and payback
   2. Other cost/benefit considerations

E. Estimating Turbine Performance
   1. Swept area method
   2. Power curve method
   3. Using manufacturers’ estimates
F. Siting Turbines
   1. Tower placement and height
   2. Mounting on buildings
   3. Urban installations
   4. Noise and impacts to wildlife
   5. Zoning and community considerations

G. Off-grid Applications
   1. Cabins, recreational vehicles, fences, and telecommunications
   2. Pumping water with wind
   3. Hybrid systems

H. Integrating Wind with Utility Systems
   1. Interconnection equipment: generators and inverters
   2. Power quality
   3. Net metering
   4. Distributed generation

I. System Installation and Maintenance
   1. Tools and parts
   2. Foundations and anchors
   3. Guyed, free-standing, and tilt-up towers
   4. Maintenance and equipment life

J. Safety and Code Considerations
   1. Tower safety
   2. Electrical hazards

VII. Suggested Text


VIII. Bibliography and Resources


1a. School or College
   MA Mat-SU
1b. Division
   No Division Code
1c. Department
   n/a

2. Course Prefix
   RE
3. Course Number
   A140
4. Previous Course Prefix & Number
   RE A194D
5a. Credits/CEUs
   1
5b. Contact Hours
   (Lecture + Lab)
   (1+0)

6. Complete Course Title
   Home Energy Basics
   Home Energy Basics
   Abbreviated Title for Transcript (30 character)
7. Type of Course
   ☑ Academic
   ☐ Preparatory/Development
   ☐ Non-credit
   ☐ CEU
   ☐ Professional Development

8. Type of Action:
   ☑ Add
   ☐ Change
   ☐ Delete
If a change, mark appropriate boxes:
   ☐ Prefix
   ☑ Course Number
   ☐ Credits
   ☐ Contact Hours
   ☐ Title
   ☐ Repeat Status
   ☐ Grading Basis
   ☐ Cross-Listed/Stacked
   ☐ Course Description
   ☐ Course Prerequisites
   ☐ Test Score Prerequisites
   ☐ Co-requisites
   ☐ Other Restrictions
   ☐ Registration Restrictions
   ☐ Class
   ☐ Level
   ☐ College
   ☐ Major
   (please specify)
   ☐ Other

9. Repeat Status No
   # of Repeats
   Max Credits
10. Grading Basis
    ☑ A-F
    ☐ P/NP
    ☐ NG
11. Implementation Date
    semester/year
    From: FALL /2013
    To: /9999
12. ☐ Cross Listed with
    ☐ Stacked with
    Cross-Listed Coordination Signature

13a. Impacted Courses or Programs:
    List any programs or college requirements that require this course.
    Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at www.uaa.alaska.edu/governance.

<table>
<thead>
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<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Initiator Name (typed): Mark Masteller
Initiator Signed Initials: _________
Date:________________

13b. Coordination Email
    Date: 02/08/2013
    submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)
13c. Coordination with Library Liaison
    Date: 02/05/2013

14. General Education Requirement
    Mark appropriate box:
    ☐ Oral Communication
    ☐ Written Communication
    ☐ Quantitative Skills
    ☐ Humanities
    ☐ Fine Arts
    ☐ Social Sciences
    ☐ Natural Sciences
    ☐ Integrative Capstone

15. Course Description (suggested length 20 to 50 words)
    Presents an overview of space heating and electricity use and production for Alaskan homes and small businesses. Includes fundamentals of building energy flows, energy efficiency, and methods for decreasing fossil fuel consumption. Introduces the relationship between efficiency measures and renewable energy systems.

16a. Course Prerequisite(s) (list prefix and number or test code and score)
    None
16b. Co-requisite(s) (concurrent enrollment required)
    n/a
16c. Other Restriction(s)
    ☐ College
    ☐ Major
    ☐ Class
    ☐ Level
16d. Registration Restriction(s) (non-codable)
    n/a
17. ☐ Mark if course has fees
18. ☐ Mark if course is a selected topic course

19. Justification for Action
    To change this course to permanent status.

Initiator (faculty only)
Mark Masteller
Initiator (TYPE NAME)

Approved
Disapproved

Approved
Disapproved

Approved
Disapproved

Approved
Disapproved

Approved
Disapproved

Approved
Disapproved

Approved
Disapproved

Approved
Disapproved
I. Initiation Date: February 2013

II. Course Information
A. College: Mat-Su College
B. Course Prefix: RE – Renewable Energy
C. Course Number: RE A140
D. Credit Hours: 1.0 (1 + 0) Contact Time
E. Course Title: Home Energy Basics
F. Grading Basis: A-F
G. Implementation Date: Fall 2013
H. Cross Listing: Not applicable
I. Stacking: Not applicable
J. Course Description:
   Presents an overview of space heating and electricity use and production for Alaskan homes and small businesses. Includes fundamentals of building energy flows, energy efficiency, and methods for decreasing fossil fuel consumption. Introduces the relationship between efficiency measures and renewable energy systems.

K. Course Attributes: Not Applicable
L. Course Prerequisites/Other Restrictions
   i. Prerequisites: None
   ii. Registration Restrictions: None
M. Course/Lab Fees: None

III. Course Level Justification
Introduces fundamental concepts of energy use in homes and small buildings.

IV. Instructional Goals and Student Learning Outcomes
A. Instructional Goals.
   This course is designed to introduce students to the ways energy is used in a home or small office building, and to help students make well-informed decisions regarding energy use, energy production, and the costs related to energy flows. The instructor will:
   • Present an overview of the basic concepts of energy flows
   • Identify and explain the building envelope components and appliances important in energy flows
   • Demonstrate ways to monitor energy use, and discuss various tools and methods commonly used to measure energy use
   • Provide opportunities for students to use tools commonly utilized to measure electricity consumption
   • Present an overview of common ways to reduce energy use
• Introduce methods to prioritize decision-making on energy-related decisions and to evaluate effectiveness of various actions

B. Defined Student Learning Outcomes. Student will be able to:

<table>
<thead>
<tr>
<th>Student Learning Outcomes</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognize basic science concepts related to energy flows</td>
<td>Class participation, exams</td>
</tr>
<tr>
<td>Identify types of basic energy monitoring tools and demonstrate their use</td>
<td>Class participation, exercises with common monitoring devices</td>
</tr>
<tr>
<td>Discuss energy improvement options with respect to both space heating and electricity</td>
<td>Homework, class participation, exams</td>
</tr>
<tr>
<td>Describe the relative priority of deploying energy efficiency measures and renewable energy systems</td>
<td>Class participation, exams</td>
</tr>
<tr>
<td>Discuss general costs and benefits of reducing fossil energy use</td>
<td>Class participation, exams</td>
</tr>
<tr>
<td>Perform basic life cycle assessment calculations relative to energy use scenarios and decisions</td>
<td>Class participation, exercises, exams</td>
</tr>
</tbody>
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V. Evaluation/Assessment Methods
Various assessment tools can be used at the instructor’s discretion, including quizzes, homework, in-class presentations, class participation, and exams.

VI. Suggested Course Outline
This course can be delivered in a variety of ways, but it will typically be delivered as a weekend intensive course to accommodate both traditional and non-traditional students and allow for off-site delivery. It can also be delivered as a 5-week course in concert with other 1-credit courses offered in the program.

A. Introduction
   1. Energy flows in typical homes and small buildings
   2. Ways to affect energy flows

B. Basic Physics Related to Electricity and Heat
   1. Laws of Thermodynamics
   2. Conduction, convection, radiation
   3. Energy conversion

C. Basic Building Science
   1. Air flow, moisture, condensation
   2. Building envelope components
   3. Insulation and air sealing/infiltration
   4. Ventilation and indoor air quality

D. Energy Monitoring Tools
   1. Understanding energy bills
   2. Electricity use meter
   3. Occupant behavior and plug loads
E. Building Retrofits
   1. Lighting and appliances
   2. Infiltration/air sealing
   3. Insulation, doors, windows
   4. Indoor air quality and ventilation equipment

F. Cost/Benefit Assessments of Energy Efficiency Actions
   1. Trends in fossil energy costs
   2. Lifecycle costs of energy management decisions

G. Assessing Renewable Energy Options
   1. Role of energy efficiency/conservation measures in assessment
   2. Practical use of renewable energy for heat and electricity
   3. Passive and active renewable energy systems
   4. Local clean energy alternatives
   5. Utility grid interconnection considerations

H. Hands-on Work with Table-top Renewable Energy Demonstration Models
   1. Components of various systems
   2. Solar photovoltaic, wind, micro-hydro, and solar thermal systems

VII. Suggested Text


VIII. Bibliography and Resources


### Course Action Request

**University of Alaska Anchorage**  
Proposal to Initiate, Add, Change, or Delete a Course

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<td>A203</td>
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<td>3</td>
<td>(3+0)</td>
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</tbody>
</table>

#### 6. Complete Course Title

Sustainable Energy Project Development  
Sustainable Energy Proj Dev

(30 character)

#### 7. Type of Course

- [x] Academic  
- [ ] Preparatory/Development  
- [ ] Non-credit  
- [ ] CEU  
- [ ] Professional Development

#### 8. Type of Action: [ ] Add  
[ ] Change  
[ ] Delete

**If a change, mark appropriate boxes:**

- [ ] Prefix  
- [ ] Credits  
- [x] Title  
- [ ] Grading Basis  
- [ ] Cross-Listed/Stacked  
- [ ] Course Description  
- [ ] Course Prerequisites  
- [ ] Co-requisites  
- [ ] Test Score Prerequisites  
- [ ] Registration Restrictions  
- [ ] Other Restrictions (please specify)

#### 9. Repeat Status No  
[ ] # of Repeats  
Max Credits

**10. Grading Basis**

- [x] A-F  
- [ ] P/NP  
- [ ] NG

11. Implementation Date (semester/year)

- From: Fall/2013  
- To: /9999

12. [ ] Cross Listed with  
[ ] Stacked with  
Cross-Listed Coordination Signature

13a. Impacted Courses or Programs:

List any programs or college requirements that require this course.

Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at www.uaa.alaska.edu/governance.

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<td>Mark Masteller</td>
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</table>

**Initiator Name (typed):** Mark Masteller  
Initiator Signed Initials: [ ] Date:

**13b. Coordination Email**  
Date: 2-8-2013  
submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

**13c. Coordination with Library Liaison**  
Date: 02/14/2013

14. General Education Requirement

Mark appropriate box:

- [ ] Oral Communication  
- [ ] Written Communication  
- [ ] Quantitative Skills  
- [ ] Humanities  
- [ ] Fine Arts  
- [ ] Social Sciences  
- [ ] Natural Sciences  
- [ ] Integrative Capstone

**15. Course Description (suggested length 20 to 50 words)**

Synthesizes facets of project development and management within the context of sustainable energy projects.

**16a. Course Prerequisite(s) (list prefix and number or test code and score)**

RE A100

**16b. Co-requisite(s) (concurrent enrollment required)**

**16c. Other Restriction(s)**

- [ ] College  
- [ ] Major  
- [ ] Class  
- [ ] Level

**17. [ ] Mark if course has fees**

**18. [ ] Mark if course is a selected topic course**

**19. Justification for Action**

Align core program course title with new certificate title that more accurately reflects program content including energy conservation/efficiency and renewable energy production.

**Initiator (faculty only)**

Mark Masteller  
Initiator (TYPE NAME)

[ ] Approved  
[ ] Disapproved

---

**Dean/Director of School/College**  
Date:

**Undergraduate/Graduate Academic**  
Date:

**Board Chair**  
Date:

**Provost or Designee**  
Date:

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[153]
I. Initiation Date: February 2013

II. Course Information
   A. College: Mat-Su College
   B. Course Prefix: RE – Renewable Energy
   C. Course Number: RE A203
   D. Credit Hours: 3.0 (3+0) Contact Time
   E. Course Title: Sustainable Energy Project Development
   F. Grading Basis: A-F
   G. Implementation Date: Fall 2013
   H. Cross Listing: Not applicable
   I. Stacking: Not applicable
   J. Course Description:
      Synthesizes facets of project development and management within the
      context of sustainable energy projects.
   K. Course Attributes: Not applicable
   L. Course Prerequisites/Other Restrictions
      i. Prerequisites: RE A100
      ii. Registration Restrictions: None
   M. Course/Lab Fees: No

III. Course Level Justification
    Builds upon introductory knowledge, skills, and vocabulary from foundation courses to
    develop advanced skills required to pursue employment and further training in the field
    of sustainable energy.

IV. Instructional Goals and Student Learning Outcomes
   A. Instructional Goals.
   The instructor will:
      • Introduce the processes of planning and developing sustainable energy projects
      • Introduce challenges associated with sustainable energy project implementation
      • Demonstrate industry-accepted tools available to project planners
B. Defined Student Learning Outcomes. Student will be able to:

<table>
<thead>
<tr>
<th>Student Learning Outcomes</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrate the processes of planning and developing sustainable energy projects</td>
<td>Projects and exams</td>
</tr>
<tr>
<td>Identify challenges and solutions associated with sustainable energy project implementation</td>
<td>Projects and exams</td>
</tr>
<tr>
<td>Identify and compare industry-accepted software tools available to project planners</td>
<td>Projects, exams, and class discussions</td>
</tr>
</tbody>
</table>

V. Evaluation/Assessment Methods
Various assessment tools can be used at the instructor’s discretion including quizzes, homework, in-class presentations, class participation, independent projects, and exams.

VI. Suggested Course Outline

A. Introduction to Sustainable Energy Project Management
   1. Project Initiation
      a. Needs assessment
      b. Conceptual design
      c. Economic viability
      d. Technical feasibility
      e. Stakeholder analysis
   2. Planning and Design
      a. Budget
      b. Schedule
      c. Project management plan
      d. Software introduction
   3. Project Execution
      a. Procurement
      b. Deliverables
      c. Monitoring, controlling, corrective, and preventive actions
   4. Project Closure

B. Community and Project Selection
   1. Identify community or project of interest
   2. Identify project partners

C. Resource Assessment
   1. Needs assessment
   2. Community assessment
   3. Data collection
   4. Resource analysis
   5. Identify information gaps

D. Modeling
   1. Using data to evaluate potential of various resources
   2. Modeling tools
E. Feasibility Study
   1. Economic feasibility of all available resources
   2. Technical feasibility of all available resources
   3. Resource feasibility
   4. Operational feasibility
   5. Risk assessment
   6. Define project management structure
   7. Recommendations for further development

F. Planning and Design
   1. Grant writing
   2. Budget
   3. Schedule
   4. Project management plan
   5. Permitting process

VII. Suggested Text


VIII. Bibliography and Resources


<table>
<thead>
<tr>
<th>1a. School or College</th>
<th>1b. Division</th>
<th>1c. Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA Mat-SU</td>
<td>No Division Code</td>
<td>n/a</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Course Prefix</th>
<th>3. Course Number</th>
<th>4. Previous Course Prefix &amp; Number</th>
<th>5a. Credits/CEUs</th>
<th>5b. Contact Hours</th>
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<tbody>
<tr>
<td>RE</td>
<td>A210</td>
<td>RE A294A</td>
<td>3</td>
<td>(3+0)</td>
</tr>
</tbody>
</table>

6. Complete Course Title
Cold Climate Construction
Cold Climate Construction
Abbreviated Title for Transcript (30 character)

7. Type of Course
- Academic
- Preparatory/Development
- Non-credit
- CEU
- Professional Development

8. Type of Action:
- Add
- Change
- Delete

If a change, mark appropriate boxes:
- Prefix
- Credits
- Title
- Grading Basis
- Course Description
- Test Score Prerequisites
- Co-requisites
- Registration Restrictions
- Level
- College
- Major
- Other

9. Repeat Status No
   - # of Repeats
   - Max Credits

- Grading Basis
  - A-F
  - P/NP
  - NG

11. Implementation Date
    - Semester/year
    - From: FALL /2013
    - To: /9999

12. Cross Listed
    - with
    - Stacked
    - Cross-Listed Coordination Signature

13a. Impacted Courses or Programs: List any programs or college requirements that require this course.

Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at www.uaa.alaska.edu/governance.

<table>
<thead>
<tr>
<th>Impact Program/Course</th>
<th>Date of Coordination</th>
<th>Chair/Coordinator Contacted</th>
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</thead>
<tbody>
<tr>
<td>2.</td>
<td></td>
<td></td>
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<tr>
<td>3.</td>
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</table>

Initiator Name (typed): Mark Masteller
Initiator Signed Initials: ______________ Date: ______________

13b. Coordination Email
- Date: 02/08/2013
- submitted to Faculty Listserv: uaa-faculty@lists.uaa.alaska.edu

13c. Coordination with Library Liaison
- Date: 02/05/2013

14. General Education Requirement
- Mark appropriate box:
  - Oral Communication
  - Written Communication
  - Quantitative Skills
  - Humanities
  - Fine Arts
  - Social Sciences
  - Natural Sciences
  - Integrative Capstone

15. Course Description (suggested length 20 to 50 words)
Covers design, construction, and basic building science related to understanding, planning, and constructing or retrofitting a durable home in a difficult climate.

16a. Course Prerequisite(s) (list prefix and number or test code and score)
None

16b. Co-requisite(s) (concurrent enrollment required)
- n/a

16c. Other Restriction(s)
- College
- Major
- Class
- Level
- n/a

16d. Registration Restriction(s) (non-codable)
- n/a

17. Mark if course has fees
- Yes
- No

18. Mark if course is a selected topic course
- Yes
- No

19. Justification for Action
- To change this course to permanent status.

Initiator (faculty only)

Mark Masteller
Initiator (TYPE NAME)

Initiator Signed Initials: ______________ Date: ______________

Approved
Disapproved

Dean/Director of School/College
Date

Approved
Disapproved

Undergraduate/Graduate Academic
Date

Approved
Disapproved

Board Chair

Approved
Disapproved

Provost or Designee
Date

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UNIVERSITY OF ALASKA ANCHORAGE
COURSE CONTENT GUIDE

I. Initiation Date: February 2013

II. Course Information
A. College: Mat-Su College
B. Course Prefix: RE – Renewable Energy
C. Course Number: RE A210
D. Credit Hours: 3.0 (3 + 0) Contact Time
E. Course Title: Cold Climate Construction
F. Grading Basis: A-F
G. Implementation Date: Fall 2013
H. Cross Listing: Not applicable
I. Stacking: Not applicable
J. Course Description: Covers design, construction, and basic building science related to understanding, planning, and constructing or retrofitting a durable home in a difficult climate. Special Note: Upon satisfactory completion, this course meets the prerequisite for the State of Alaska Contractor Residential Endorsement and provides 16 continuing education credits by the State of Alaska, Division of Occupational Licensing for General Contractors with Residential Endorsement.

K. Course Attributes: Not Applicable
L. Course Prerequisites/Other Restrictions
   i. Prerequisites: None
   ii. Registration Restrictions: None
M. Course/Lab Fees: Yes

III. Course Level Justification
Builds upon basic construction experience to explore vocabulary, concepts, and skills related to energy efficiency and durability for residential design and construction in cold climates.

IV. Instructional Goals and Student Learning Outcomes
A. Instructional Goals.
   Builds on basic construction experience to provide an understanding of the concepts and techniques used in cold climates to improve the energy-efficiency, safety, and durability of Alaskan homes. Emphasizes the “house as a system” of interconnected components that work together to lower energy costs and provide durability and comfort. Uses Alaskan case studies and other information to illustrate concepts. The instructor will:
   - Present an overview of building envelope components and cold-climate construction techniques related to controlling energy and moisture flows
   - Relate cold-climate construction techniques to indoor air quality, safe building and appliance ventilation, and building durability
- Compare and contrast use of cold-climate construction techniques in new construction and retrofit projects
- Demonstrate energy use models and provide opportunities for students to calculate residential energy demands

B. Defined Student Learning Outcomes. Student will be able to:

<table>
<thead>
<tr>
<th>Student Learning Outcomes</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe energy and moisture flows in homes and associate the causes of these flows with impacts on energy use, building durability, and safety</td>
<td>Journal, quizzes, homework, class participation, exams</td>
</tr>
<tr>
<td>Identify building envelope components and the roles these components play in energy use and moisture flows</td>
<td>Journal, quizzes, class participation, homework, exams</td>
</tr>
<tr>
<td>Explain the importance of proper home and appliance ventilation, indoor air quality, and safety</td>
<td>Quizzes, class participation, exams</td>
</tr>
<tr>
<td>Explain residential construction techniques relative to climatic conditions found in Alaska for both new construction and retrofit projects</td>
<td>Journal, quizzes, class participation, homework, exams</td>
</tr>
<tr>
<td>Compute residential electric power, space heat, and domestic hot water demands</td>
<td>Journal, energy-use modeling, quiz, exam</td>
</tr>
</tbody>
</table>

V. Evaluation/Assessment Methods
Various assessment tools can be used at the instructor’s discretion including attendance, quizzes, homework, journal development, class participation, independent projects, and exams.

VI. Suggested Course Outline
This course may be delivered as a standard 15-week course or as an intensive course in a shorter time frame to accommodate both traditional and non-traditional students and allow for off-site delivery.

A. Energy Flow and Physics
2. Types of heat flow: conduction, convection, and radiation
3. Reasons for heat flow: stack, wind, flue, and ventilation effects
4. Understanding temperature, relative humidity, and comfort
5. Efficiencies: British Thermal Units and forms of energy
6. Fuel cost comparison formulas
7. Calculating heating degree days, design temperature, and design heat loss

B. Energy and Building Durability
1. Construction characteristics of residential structures
2. Building components and their functions
3. Climates, exposures, system qualities, and performance expectations
4. Identifying building wear parts
5. Understanding moisture flow and sources: design considerations
6. Air leaks in building components
7. Above grade, below grade, and occupant-generated moisture sources
8. Dew point, condensing surfaces, and materials

C. Building Construction: Foundations
1. Foundation basics: types used in Alaska
2. Soil conditions and foundations
3. Types of foundation damage
4. Moisture control: materials, ventilation strategies, and condensation control
5. Heat loss and appropriate interior or exterior insulation materials
6. Control of radon and other soil gases

D. Building Construction: Walls
1. Basic concepts
2. Wall types and components
3. Wall transitions at floors and ceilings
4. Effects of framing components and heat loss
5. Advanced framing techniques
6. Elements of airtight wall construction

E. Building Construction: Roofs and Attics
1. Design elements of hot and cold roofs
2. Moisture accumulation and ventilation approaches
3. Ceiling penetrations: electrical, plumbing, interior partitions, and attic hatches
4. Ice dams
5. Insulation R-values and appropriate insulation levels
6. Materials and strategies for insulating various roof assemblies
7. Trusses and uplift
8. Self-healing membranes and the unplanned dominant pressure boundary

F. Insulating Materials
1. Moisture and heat flow characteristics of insulation products
2. Conduction, convection, and radiation effects of insulations
3. Fiberglass and cellulose insulation: batt, rigid, loose, blown, and dense-packed
4. Foam insulation: spray or rigid
5. Tolerances: moisture, durability, UV radiation, and animals

G. Cladding, Flashings, and Weather Barriers
1. Protection from wind and rain
2. Air and weather barriers: knowing the difference
3. Installation and durability of air and weather barriers
4. Weather barriers, flashings, and gravity
5. Drainage, drying, or both
6. Ventilation cladding techniques

H. Windows and Doors
1. Windows that leak
2. Window styles and options
3. Heat loss and solar gain through windows
4. Improving window thermal and condensation performance
5. Gas fills, coatings, edge-effect, frame effect, and spacer technology
6. Design, orientation, and installation details for windows and doors
7. Installation of windows and doors with integration into drainage planes
8. Air sealing for rough openings

I. Ventilation and Indoor Air Quality
1. Principles of good ventilation
2. Calculation of ventilation requirements
3. Attached spaces and unplanned airflows
4. Ventilation codes
5. Effective ventilation systems and design considerations
6. System operation and maintenance issues
7. Source control

J. Residential Energy Use Modeling
1. General use of energy models
2. AkWarm: Alaska Housing Finance Corporation energy analysis software

K. Heating and Domestic Hot Water
1. Calculation of heat loss
2. Attributes/comparison of fuel sources and heating systems
3. Keeping heating systems simple, reliable, safe, and well-maintained
4. Sizing heating and domestic hot water requirements
5. Integration of domestic hot water and space heating
6. Control options

L. Retrofitting Buildings
1. Retrofit planning: cost-effectiveness and avoid causing more damage
2. Retrofitting from the interior or exterior
3. Solving air leakage problems: the house as a system

M. Commissioning
1. Combustion safety and worst-case depressurization
2. Appliance ventilation and exhaust requirements
3. Occupant education: energy consumption and building operation
4. Lighting, appliances, plug loads, utility bills, and service cycles
5. Routine inspection and maintenance

VII. Suggested Text


VIII. Bibliography and Resources


# Program/Prefix Action Request

**University of Alaska Anchorage**

**Proposal to Initiate, Add, Change, or Delete a Program of Study or Prefix**

<table>
<thead>
<tr>
<th>1a. School or College</th>
<th>1b. Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA Mat-SU</td>
<td>N/A</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>2. Complete Program Title/Prefix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable Energy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. Type of Program</th>
</tr>
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<tbody>
<tr>
<td>Choose one from the appropriate drop down menu:</td>
</tr>
<tr>
<td>Undergraduate: or Graduate: Occupational Endorsement Certificate</td>
</tr>
<tr>
<td>CHOOSE ONE</td>
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</tbody>
</table>

This program is a Gainful Employment Program: ☒ Yes or ☐ No

<table>
<thead>
<tr>
<th>4. Type of Action:</th>
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<tbody>
<tr>
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<td>☐ Inactivate</td>
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<tr>
<th>5. Implementation Date (semester/year)</th>
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<tbody>
<tr>
<td>From: FALL/2013 To: /9999</td>
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</table>

<table>
<thead>
<tr>
<th>6a. Coordination with Affected Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department, School, or College: MSC RH Department</td>
</tr>
<tr>
<td>Initiator Name (typed): Mark Masteller</td>
</tr>
<tr>
<td>Initiator Signed Initials: ____________</td>
</tr>
<tr>
<td>Date: ________________</td>
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<table>
<thead>
<tr>
<th>6b. Coordination Email submitted to Faculty Listserv (<a href="mailto:uaa-faculty@lists.uaa.alaska.edu">uaa-faculty@lists.uaa.alaska.edu</a>)</th>
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<tbody>
<tr>
<td>Date: 02/08/2013</td>
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<th>6c. Coordination with Library Liaison</th>
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<td>Date: 02/05/2013</td>
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<table>
<thead>
<tr>
<th>7. Title and Program Description - Please attach the following:</th>
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<tbody>
<tr>
<td>☐ Cover Memo</td>
</tr>
<tr>
<td>☒ Catalog Copy in Word using the track changes function</td>
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</table>

<table>
<thead>
<tr>
<th>8. Justification for Action</th>
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</thead>
<tbody>
<tr>
<td>Change the program title and content to align with industry standards, encompassing energy efficiency and renewable energy production. The Sustainable Energy program will emphasize the role of energy conservation and efficiency components (demand-side actions) in concert with reneweble energy production (supply-side actions) in education and training related to clean energy systems.</td>
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<table>
<thead>
<tr>
<th>Initiator (faculty only)</th>
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<tbody>
<tr>
<td>Mark Masteller</td>
</tr>
<tr>
<td>Initiator (TYPE NAME)</td>
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<table>
<thead>
<tr>
<th>Initiator (faculty only) Date</th>
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<tbody>
<tr>
<td>Mark Masteller Date</td>
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<table>
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<tbody>
<tr>
<td>Dean/Director of School/College</td>
<td></td>
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<tr>
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<td>College/School Curriculum Committee Chair</td>
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<tr>
<td>Date Date</td>
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<td>Provost or Designee</td>
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<td>Date Date</td>
<td></td>
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</tbody>
</table>

164
The Sustainable Energy program is offered through Matanuska-Susitna College.

**Occupational Endorsement Certificate, Sustainable Energy**

The Sustainable Energy Occupational Endorsement Certificate program provides education and training in energy efficiency and renewable energy and addresses many contemporary energy issues. The program provides the fundamental concepts, basic academic preparation, and skills necessary for students to pursue either employment or further training as sustainable energy technicians in the energy, construction, utility, and maintenance industries. It can also serve as a stepping stone into science-, engineering-, and architecture-related certificate, associate, or baccalaureate programs.

Students are introduced to the physical principles of various energy conservation and renewable energy technologies. Coursework incorporates the appropriate skills and knowledge necessary for students to become effective employees. Students will also be able to apply course content to personal projects, such as home retrofits and off-grid cabins.

**Student Learning Outcomes**

Upon completion of the occupational endorsement certificate, students will demonstrate:

- Knowledge of energy efficiency and sustainable energy resources and technologies
- Introductory understanding of basic physics and power management as applied to energy efficiency and sustainable energy
- Entry-level skills for energy efficiency/renewable energy project development and management

**Admission Requirements**

See Occupational Endorsement Certificate Admission Requirements in Chapter 7, Academic Standards and Regulations.

**Advising**

Students are urged to meet with a faculty advisor prior to enrollment in Sustainable Energy classes.

**Academic Progress**

In order to receive the Sustainable Energy Occupational Endorsement Certificate, students must achieve a grade of C or better in all courses required for the occupational endorsement certificate.

**Graduation Requirements**

The Sustainable Energy Occupation Endorsement Certificate requires a minimum of 16 credits. The program is structured as 9 credits of foundation knowledge and a minimum of 7 credits of electives that allow students (in consultation with their advisor) to specialize in several emphasis areas related to sustainable energy, or to customize their program.

**Core Requirements (9 credits)**

- RE A100 Principles of Sustainable Energy (3)
- RE A203 Sustainable Energy Project Development (3)
MATH A105 Intermediate Algebra (3)

**Electives (minimum of 7 credits)**
- RE A102 Applied Physics for Renewable Energy (3)
- RE A110 Intro to Solar Photovoltaic Systems (1)
- RE A120 Intro to Solar Thermal Systems (1)
- RE A130 Intro to Small Wind Systems (1)
- RE A140 Home Energy Basics (1)
- RE A210 Cold Climate Construction (3)
- RH A105 Electrical Circuits for Refrigeration & Heating I (3)
- RH A211 Customer Relations and Job Etiquette (1)

**FACULTY**

*Mark Masteller, Assistant Professor, mamasteller@matsu.alaska.edu*
The Sustainable Renewable Energy program is offered through Matanuska-Susitna College.

**Occupational Endorsement Certificate, Sustainable Renewable Energy**

The Sustainable Renewable Energy Occupational Endorsement Certificate program provides education and training in energy efficiency and renewable energy, and addresses many of the energy issues that influence Alaskans. The program provides the fundamental concepts, basic academic preparation, and skills necessary for students to pursue either employment or gain further training as sustainable energy technicians in the energy, construction, utility, and maintenance industries. It can also serve as a stepping stone into science-, engineering-, and architecture-related certificate, associate, or baccalaureate programs.

Students are introduced to the physical principles of various energy conservation and renewable energy technologies. Coursework incorporates the appropriate skills and knowledge necessary for students to become effective employees. Students will also be able to apply knowledge/course content into their personal/home personal projects, such as home retrofits and off-grid cabins.

In the Renewable Energy Occupational Endorsement Certificate program, students learn the fundamental concepts and skills necessary to pursue employment or gain further training as renewable energy technicians. Students are introduced to the physical principles of various renewable energy sources, including solar, wind, hydro, and geothermal power sources. Terminology, energy conservation, and safety are emphasized throughout the program. Coursework incorporates the appropriate skills and knowledge necessary for students to become effective employees in the energy, utility, and maintenance industries. Career pathways may include operating large- and small-scale renewable power production facilities, designing, installing, and maintaining renewable energy systems, or assisting homeowners and businesses with energy efficiency. A required practicum provides applied experience in a workplace setting.

**Student Learning Outcomes**

Upon completion of the occupational endorsement certificate, students will demonstrate:

- Knowledge of energy efficiency and sustainable energy resources and technologies
- Basic technical skills for diesel engine repair
- Introductory understanding of basic physics and power management as applied to energy efficiency and sustainable energy
- Familiarity with OSHA General Industry standards and safety
- Entry-level skills for energy efficiency/renewable energy project development and management.

**Admission Requirements**

See Occupational Endorsement Certificate Admission Requirements in Chapter 7, Academic Standards and Regulations.
Advising

Students are urged to meet with a faculty advisor prior to enrollment in Sustainable Energy classes.

Academic Progress

In order to receive the Sustainable Renewable Energy Occupational Endorsement Certificate, students must achieve a grade of C or better in all courses required for the occupational endorsement certificate.

Graduation Requirements

The Sustainable Energy Occupation Endorsement Certificate requires a minimum of 16 credits. The program is structured as 9 credits of foundation knowledge and a minimum of 7 credits of electives that allow students in consultation with their advisor to specialize in several emphasis areas related to sustainable energy, or to customize their program.

Core Requirements (9 credits)

- RE A100 Principles of Sustainable Energy (3)
- RE A203 Sustainable Energy Project Development (3)
- MATH A105 Intermediate Algebra (3)

Electives (minimum of 7 credits)

- RE A102 Applied Physics for Renewable Energy (3)
- RE A194A110 Intro to Solar Photovoltaic Systems (1)
- RE A194B120 Intro to Solar Thermal Systems (1)
- RE A194D140 Home Energy Basics (1)
- RE A294A210 Cold Climate Construction (3)
- RH A105 Electrical Circuits for Refrigeration & Heating I (3)
- RH A211 Customer Relations and Job Etiquette (1)

Complete the following required courses (23 credits):

- RE A100 Introduction to Renewable Energy (3)
- RE A101 Industrial Safety for Renewable Energy (2)
- RE A102 Applied Physics for Renewable Energy (3)
- RE A106 Introduction to Diesel Engines (3)
- RE A200 Power Generation Systems (3)
- RE A201 Power System Management (3)
- RE A203 Renewable Energy Project Development (3)
- RE A205 Renewable Energy Practicum (3)

FACULTY

Mark Masteller, Assistant Professor, mmasteller@matc.alaska.edu
Diane Jardel Mielke, Coordinator/Instructor, dljardel@uaa.alaska.edu, Assistant Professor, dmmielke@matsu.alaska.edu

INTERNAL NOTE FOR DRAFT REVIEW

Do I need to list classes that are still “on the books” but which will be unused pending program expansion and/or might be discontinued? (RE A101, A106, A200, A201, A205).

Can I list courses that are currently “trial” (the 194 and 294 classes) with their hoped-for new course numbers?
Need to clarify whether Math105 is simply required for OE or a pre-requisite for any class (A100 or A102). It has NOT been a required pre-requisite to date – how does this impact folks currently in the program who are hoping to have it open soon so they can get the OE?? (Only one person impacted that I know of – others have had 105/Int. Algebra.)
Memorandum

To: SoE Curriculum Committee

From: Bill Hazelton, Chair, Geomatics Department

Date: 7th November, 2012.

Subject: Bachelor of Science, Geomatics

Attached please find a PAR, Catalog Materials, and various CARs and CCGs for courses that will be changed to include minor changes in the Bachelor of Science, Geomatics.

The changes in the program are to allow students to take the GEO A490 and GIS A490 courses more than once, and to modify the prerequisites of the GEO A365 course. In addition some minor changes have been made in the catalog, to update the ABET program details, correct small typos, and to adjust the elective courses in the program.

At their meeting on 6th November, 2012, the faculty of the Geomatics Department approved the modification to the program and courses so that they could be moved through the system for implementation in Fall, 2013.

[Signature]
1a. School or College  
EN SOENGR  

1b. Department  
Geomatics  

2. Complete Program Title/Prefix  
Bachelor of Science, Geomatics  

3. Type of Program  
Choose one from the appropriate drop down menu: Undergraduate: or Graduate:  
Bachelor of Science  
CHOOSE ONE  

This program is a Gainful Employment Program:  
☐ Yes or ☐ No  

4. Type of Action:  
PROGRAM  
☐ Add  
☒ Change  
☐ Delete  

PREFIX  
☐ Add  
☐ Change  
☐ Inactivate  

5. Implementation Date (semester/year)  
From: Fall/2013 To: /9999  

6a. Coordination with Affected Units  
Department, School, or College:  
Initiator Name (typed): N.W.J. Hazelton  
Initiator Signed Initials: _________ Date:______________  

6b. Coordination Email submitted to Faculty Listserv (uaa-faculty@lists.uaa.alaska.edu)  
Date: 10/15/2012  

6c. Coordination with Library Liaison  
Date: 10/15/2012  

7. Title and Program Description - Please attach the following:  
☒ Cover Memo  
☒ Catalog Copy in Word using the track changes function  

8. Justification for Action  
Minor changes in Catalog entry to adjust electives, to include changes in ABET contact details, and to correct small typos.  

Initiator (faculty only)  
N.W.J. Hazelton  
Initiator (TYPE NAME)  
Date  

☐ Approved  
☐ Disapproved  
Dean/Director of School/College  
Date  

☐ Approved  
☐ Disapproved  
Department Chair  
Date  

☐ Approved  
☐ Disapproved  
Undergraduate/Graduate Academic Board Chair  
Date  

☐ Approved  
☐ Disapproved  
College/School Curriculum Committee Chair  
Date  

☐ Approved  
☐ Disapproved  
Provost or Designee  
Date
The Department of Geomatics offers a two-year Associate of Applied Science in Geomatics, a four-year Bachelor of Science in Geomatics, a minor in Geographic Information Systems (GIS), and an Undergraduate Certificate in Geographic Information Systems (GIS). Students seeking the baccalaureate degree may graduate in one of two emphasis areas: Surveying or GIS. Students seeking continuing education for technical or professional enhancement or a concentrated area of study in GIS should consider either the minor in GIS or the Undergraduate Certificate in GIS. The Geomatics program is science-based and includes:

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The wide diversity in the profession creates a similar diversity of employment opportunities. The Undergraduate Certificate in GIS educates students with a broad base of concepts and theory, provides them with hands-on training in real world problems that are relevant to Alaska’s environment, and allows them to explore several thematic areas in GIS applications, such as facilities management, transportation, marine environments, and natural resources.

The minor in GIS is designed for students seeking to enhance their knowledge of GIS and remote sensing to complement a major baccalaureate degree in a variety of disciplines including science, art, business management and engineering. GIS, as a part of geospatial science and information technologies, is widely used in many industries important to Alaska (e.g., oil, gas), governance and administration (municipalities and the state), statewide and federal agencies and departments (transportation, natural resources, land management, parks and recreation, etc.), research (sustainability, biodiversity, ecology, geology, anthropology, socioeconomics, etc.), homeland security, military applications and non-profit organizations.

The Associate of Applied Science in Geomatics prepares students for technician-level employment as land survey technicians or as automated mapping technicians. Those working as survey technicians frequently work outdoors, travel to various job locations, and enjoy an independent lifestyle. Automated mapping technicians work with the latest cartographic techniques and equipment and easily transfer skills learned in geomatics courses to other disciplines.

The Bachelor of Science prepares students for a wide variety of professional level opportunities. Since Alaska poses unique geomatics challenges, the curriculum emphasizes northern principles and practices. UAA graduates are highly employable in the Alaska marketplace and worldwide. Employment opportunities are found in private industry, government, and municipal agencies. Geomatics graduates working at the professional level enjoy responsibility and a choice of indoor and outdoor employment with many opportunities for advancement and diversification.

The new high-tech fields open employment in GIS, photogrammetry, remote sensing, land surveying, automated mapping, land design and planning, survey engineering, and resource management positions. In Alaska, geomatics professionals work on state and Native land claims, mining claims, fishing leases, petroleum reserves, forest selections, transportation corridors, private developments, and government and military projects. In Alaska and elsewhere, geomatics professionals work in land surveying, land development and design, mapping and tax assessment, the defense industry, environmental engineering assessment and management, public safety and welfare, medicine, transportation, agriculture, business, and natural sciences.

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Accreditation
The Bachelor of Science, Geomatics program at UAA is accredited by the Applied Science Accreditation Commission (ASAC) of ABET, http://www.abet.org.

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Program Educational Objectives
The UAA Bachelor of Science, Geomatics program has the following Program Educational Objectives.

Within five years of graduation, graduates of the Geomatics program will have achieved the following.
1. Graduates who are pursuing careers in the surveying area will have attempted the AELS Board’s Fundamentals of Surveying examination, and their overall pass rate will be at least 80%.
2. At least 60% of graduates who are pursuing careers in non-surveying areas will have attempted equivalent professional certification or registration, e.g., CP, GISP, as appropriate for their career path.
3. At least 60% of graduates will be members of professional organizations relevant to their career of choice.
4. At least 80% of graduates will have found employment in the fields within the geomatics disciplines, including: surveying of various types, mapping and cartography, GIS/LIS, remote sensing, geodesy, photogrammetry or hydrographic surveying.
5. At least 80% of graduates will have completed at least one professional development course or session, or completed one higher education course.
6. At least 50% of graduates will have taught at least one workshop or training session, made one conference presentation, or published one article relevant to their career.

Student Learning Outcomes
In keeping with the program educational objectives, it is expected that graduates of the UAA Geomatics program will have:

1. An ability to apply knowledge of mathematics, statistics, and general physics;
2. An ability to collect, analyze and interpret data in all of the recognized surveying and mapping areas;
3. An ability to identify, formulate, and design a geomatics system, component or process to meet desired needs;
4. An ability to function on multidisciplinary as well as on interdisciplinary teams;
5. An ability to think critically and to solve geomatics problems creatively and constructively;
6. An understanding of professional and ethical responsibility;
7. An ability to communicate effectively;
8. The broad education necessary to understand the impact of geomatics solutions in a global and societal context;
9. A recognition of the need for, and ability to engage in, lifelong learning;
10. A knowledge of contemporary issues in professional practice;
11. An ability to use the techniques, skills and modern geomatics tools necessary for geomatics practice; and
12. An ability to apply knowledge in all six areas of surveying and mapping:
   i. Field surveying and methods;
   ii. Photogrammetric mapping, image interpretation and remote sensing;
   iii. Surveying calculation and data adjustment;
   iv. Geodetic coordinates and astronomy;
   v. Cartographic representation, projections, and map production;
   vi. Computer-based multipurpose cadastre, geographic information systems.

Mission Statement
The Department of Geomatics’ mission is to contribute to the wider body of knowledge in the geospatial sciences, and to disseminate this to society. By advancing our theoretical, professional, technical and educational capabilities, we will develop and maintain a community dedicated to the highest standards of scholarship. Within a student-centered environment, we are committed
to the theoretical, professional and technical advancement of all our students, so that they may contribute to the advancement of their profession, their society, and their world, throughout their lives.

**Honors in Geomatics**

Undergraduate students may be recognized for exceptional performance by earning Departmental Honors in Geomatics. In order to receive honors in Geomatics, a student must meet each of the following requirements:

1. Complete all requirements for a BS in Geomatics.
2. Be an active member for at least one year of both a national and an on-campus student chapter of a professional geomatics society that addresses issues relevant to the geomatics profession.
3. Have a GPA of 3.50 or higher in their Geomatics and Geographic Information System courses of their catalog year. Have a GPA of 3.30 or higher for their overall cumulative GPA.
4. Pass the Fundamentals of Surveying Examination prior to the completion of the first semester of their senior year.
5. Document a minimum of eight weeks work experience while a student at the University of Alaska in a geomatics or geomatics related position.

**Advising**

All undergraduate students are encouraged to meet with their academic advisor each semester for the purpose of reviewing their academic progress and planning future courses. It is particularly important for students to meet with their advisor whenever academic difficulties arise. Students are encouraged to consult the faculty in the Department of Geomatics for assistance in designing their course of study to ensure that all prerequisites have been met and that university and major degree requirements are understood and followed.

**Preparation**

The university offers courses to help students without this preparation to meet the skill level required in the Geomatics program. Insufficient preparation will increase the number of semesters required to complete either degree. Students seeking the Undergraduate Certificate in Geographic Information Systems, the Associate of Applied Science or Bachelor of Science in Geomatics should prepare for entrance into the program by completing the following high school courses:

<table>
<thead>
<tr>
<th>Mathematics</th>
<th>Science</th>
<th>English Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algebra II</td>
<td>Physics</td>
<td>Skill level as demonstrated by ACT, SAT or approved placement test to qualify for enrollment in ENGL A111</td>
</tr>
<tr>
<td>Trigonometry</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Undergraduate Certificate, Geographic Information Systems (GIS)**

**Admission Requirements**

Satisfy the Admission to Certificate and Associate’s Degree Programs Requirements in Chapter 7, Academic Standards and Regulations.

**Course Requirements**

Certain courses require prerequisites or faculty permission. Call (907) 786-1972 for further information.

**Major Requirements**

In order to receive an Undergraduate Certificate in GIS, students must achieve a grade of C or higher in all courses applied to the certificate.

1. Complete the following required courses (23 credits):

   - GEO A137 Principles of Mapping 3
   - GEO A167 Remote Sensing and Image Analysis 4
   - GEO A460 Geomatics Design Project 3
   - GIS A268 Elements of Geographic Information Systems (GIS) 4
2. Complete 9 credits from the following elective courses:

- GEO A354 City and Regional Planning (3)
- GEO A490 Selected Advanced Topics in Geomatics (1-6)
- GIS A295 Internship in Geographic Information Systems I (3)
- GIS A495 Internship in Geographic Information Systems II (3)
- GIS A359 Land Information Systems (3)
- GIS A370 GIS and Remote Sensing for Natural Resources (3)
- GIS A371 GIS Applications I (3)
- GIS A433 Coastal Mapping (3)
- GIS A468 Integration of Geomatics Technologies (3)
- GIS A471 GIS Applications II (4)
- GIS A490 Selected Advanced Topics in GIS (1-6)

3. A maximum of 3 credits of Internship (GIS A295 or GIS A495) and 3 credits of Advanced Topics in Geomatics (GEO A490) or Advanced Topics in GIS (GIS A490) can be counted toward the Certificate in GIS. Faculty approval of the GEO A490 or GIS A490 topic is necessary for application of the course to the certificate program.

4. A total of 32 credits is required for the Certificate in GIS.
## Associate of Applied Science, Geomatics

### Admission Requirements
Satisfy the Admission to Undergraduate Certificate and Associate’s Degree Programs Requirements in Chapter 7, Academic Standards and Regulations.

### General University Requirements
Complete the Associate of Applied Science General Degree Requirements located at the beginning of this chapter. Some of the major requirements will also fulfill Associate of Applied Science degree general requirements. Students should coordinate choices carefully with their academic advisor in the Department of Geomatics.

### Academic Progress
A student who is unable to earn a satisfactory grade in the major requirement courses during their initial enrollment may attempt to earn a satisfactory grade one additional time, on a space-available basis. ‘Satisfactory grade’ means a grade of C or better, as this is the usual requirement for pre-requisites in Geomatics courses (GEO and GIS). Failure to earn a grade of C or better on the second attempt may result in removal from the Geomatics program.

### Major Requirements

1. Complete 4 credits in Physics:  
   - PHYS A123  Basic Physics I (3)  
   - PHYS A123L  Basic Physics I Laboratory (1)  
   - or  
   - PHYS A211  General Physics I (3)  
   - PHYS A211L  General Physics I Laboratory (1)  

2. Complete the following required courses (50 credits):  
   - CSE A102  Introduction to Computer Systems  
   - ENGL A212  Technical Writing  
   - ENGR A161  Engineering Practices II  
   - GEO A137  Principles of Mapping  
   - GEO A146  Surveying Computations  
   - GEO A155  Fundamentals of Surveying  
   - GEO A157  Analytical and Digital Cartography  
   - GEO A158  Geomatics Computer Fundamentals  
   - GEO A167  Remote Sensing and Image Analysis  
   - GEO A248  Digital Terrain Cartography  
   - GEO A256  Municipal and Civil Geomatics  
   - GEO A257  Elements of Photogrammetry  
   - GEO A266  Advanced Surveying  
   - GEO A267  Boundary Law I  
   - GIS A268  Elements of Geographic Information Systems (GIS)  
   - MATH A109  Precalculus †  

3. Electives to total of 63 credits.

† MATH A107 College Algebra and MATH A108 Trigonometry (both courses) may be substituted for MATH A109 Precalculus.
Bachelor of Science, Geomatics

Admission Requirements
Complete the Admission to Baccalaureate Programs Requirements in Chapter 7, Academic Standards and Regulations.

Academic Progress
A student who is unable to earn a satisfactory grade in the major requirement courses during their initial enrollment may attempt to earn a satisfactory grade one additional time, on a space-available basis. ‘Satisfactory grade’ means a grade of C or better, as this is the usual requirement for pre-requisites in Geomatics courses (GEO and GIS). Failure to earn a grade of C or better on the second attempt may result in removal from the Geomatics program.

Graduation Requirements
A. General University Requirements
Complete the General University Requirements for all Baccalaureate Degrees at the beginning of this chapter.

B. General Education Requirements
Complete the General Education Requirements for Baccalaureate Degrees at the beginning of this chapter.

C. Major Requirements
1. Complete 4 credits in Physics from one of the following course pairs:
   - PHYS A123  Basic Physics I (3)
   - PHYS A123L Basic Physics I Laboratory (1)
   - or
   - PHYS A211  General Physics I (3)
   - PHYS A211L General Physics I Laboratory (1)

2. Complete the following (21 credits):
   - CSE A102  Introduction to Computer Systems 1
   - ENGL A212  Technical Writing 3
   - ENGR A161  Engineering Practices II 3
   - GEO A158  Geomatics Computer Fundamentals 1
   - MATH A107 College Algebra and MATH A108 Trigonometry (both) may be substituted for MATH A109 Precalculus.
   - MATH A109  Precalculus † 6
   - MATH A272  Applied Calculus ◊ 3
   - STAT A253  Applied Statistics for the Sciences 4

†  MATH A107 College Algebra and MATH A108 Trigonometry (both) may be substituted for MATH A109 Precalculus.
◊  MATH A200 Calculus I may be substituted for MATH A272 Applied Calculus.

3. Complete all of the following (71 credits):
   - BA/JUST A241  Business Law I 3
   - GEO A137  Principles of Mapping 3
   - GEO A146  Surveying Computations 3
   - GEO A155  Fundamentals of Surveying 3
   - GEO A157  Analytical and Digital Cartography 3
   - GEO A167  Remote Sensing and Image Analysis 4
   - GEO A248  Digital Terrain Cartography 3
   - GEO A256  Municipal and Civil Geomatics 3
   - GEO A257  Elements of Photogrammetry 3
   - GEO A266  Advanced Surveying 3
   - GEO A267  Boundary Law I 4
   - GEO A301  Geomatics Professional Development I 1
   - GEO A302  Geomatics Professional Development II 1
   - GEO A303  Geomatics Professional Development III 1
   - GEO A355  Land Development and Design 3
   - GEO A359  Geodesy and Map Projections 3
4. Complete at least 11 credits in one of the emphasis areas.

**Surveying Emphasis**

a. Complete the following (4 credits):

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEO A433</td>
<td>Hydrographic Surveying</td>
<td>3</td>
</tr>
<tr>
<td>PEP A110</td>
<td>Remote First Aid (1)</td>
<td>1</td>
</tr>
<tr>
<td>or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEP A112</td>
<td>First Aid and CPR for Professionals (1)</td>
<td></td>
</tr>
</tbody>
</table>

b. Complete 7 credits from the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEO A354</td>
<td>City and Regional Planning (3)</td>
<td></td>
</tr>
<tr>
<td>GEO A358</td>
<td>Programming for Digital Cartography (3)</td>
<td></td>
</tr>
<tr>
<td>GEO A459</td>
<td>Geodetic Geomatics (3)</td>
<td></td>
</tr>
<tr>
<td>GEO A467</td>
<td>Analytical and Digital Photogrammetry (3)</td>
<td></td>
</tr>
<tr>
<td>GEO A490</td>
<td>Selected Advanced Topics in Geomatics (1-6)</td>
<td></td>
</tr>
<tr>
<td>GIS A367</td>
<td>GIS and Remote Sensing (3)</td>
<td></td>
</tr>
<tr>
<td>GIS A369</td>
<td>Land Information Systems (3)</td>
<td></td>
</tr>
<tr>
<td>GIS A371</td>
<td>GIS Applications I (3)</td>
<td></td>
</tr>
<tr>
<td>GIS A433</td>
<td>Coastal Mapping (3)</td>
<td></td>
</tr>
<tr>
<td>GIS A458</td>
<td>Design and Management of Spatial Data (3)</td>
<td></td>
</tr>
<tr>
<td>GIS A471</td>
<td>GIS Applications II (4)</td>
<td></td>
</tr>
<tr>
<td>GIS A490</td>
<td>Selected Advanced Topics in GIS (1-6)</td>
<td></td>
</tr>
</tbody>
</table>

**Geographic Information Systems (GIS) Emphasis**

a. Complete the following (3 credits):

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>GIS A458</td>
<td>Design and Management of Spatial Data</td>
<td>3</td>
</tr>
</tbody>
</table>

b. Complete 8 credits from the following:

<table>
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5. A total of 131 credits is required for the degree, of which 42 must be upper division.

FACULTY
Don Davis Jr., Professor Emeritus
Gennady Gienko, Associate Professor, ggienko@uaa.alaska.edu
Bill Hazelton, Associate Professor/Chair, nhazelton@uaa.alaska.edu
Jeffery Hollingsworth, Assistant Professor, jphollingsworth@uaa.alaska.edu

<< Geomatics catalog copy, ending page 250. >>
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  2. At least 60% of graduates who are pursuing careers in non-surveying areas will have attempted equivalent professional certification or registration, e.g., CP, GISP, as appropriate for their career path.
  3. At least 60% of graduates will be members of professional organizations relevant to their career of choice.
  4. At least 80% of graduates will have found employment in the fields within the geomatics disciplines, including: surveying of various types, mapping and cartography, GIS/LIS, remote sensing, geodesy, photogrammetry or hydrographic surveying.
  5. At least 80% of graduates will have completed at least one professional development course or session, or completed one higher education course.
  6. At least 50% of graduates will have taught at least one workshop or training session, made one conference presentation, or published one article relevant to their career.

**Student Learning Outcomes**
In keeping with the program educational objectives, it is expected that graduates of the UAA Geomatics program will have:

1. An ability to apply knowledge of mathematics, statistics, and general physics;
2. An ability to collect, analyze and interpret data in all of the recognized surveying and mapping areas;
3. An ability to identify, formulate, and design a geomatics system, component or process to meet desired needs;
4. An ability to function on multidisciplinary as well as on interdisciplinary teams;
5. An ability to think critically and to solve geomatics problems creatively and constructively;
6. An understanding of professional and ethical responsibility;
7. An ability to communicate effectively;
8. The broad education necessary to understand the impact of geomatics solutions in a global and societal context;
9. A recognition of the need for, and ability to engage in, lifelong learning;
10. A knowledge of contemporary issues in professional practice;
11. An ability to use the techniques, skills and modern geomatics tools necessary for geomatics practice; and
12. An ability to apply knowledge in all six areas of surveying and mapping:
   i. Field surveying and methods;
   ii. Photogrammetric mapping, image interpretation and remote sensing;
   iii. Surveying calculation and data adjustment;
   iv. Geodetic coordinates and astronomy;
   v. Cartographic representation, projections, and map production;
   vi. Computer-based multipurpose cadastre, geographic information systems.

**Mission Statement**
The Department of Geomatics’ mission is to contribute to the wider body of knowledge in the geospatial sciences, and to disseminate this to society. By advancing our theoretical, professional, technical and educational capabilities, we will develop and maintain a community dedicated to the highest standards of scholarship. Within a student-centered environment, we are committed
to the theoretical, professional and technical advancement of all our students, so that they may contribute to the advancement of their profession, their society, and their world, throughout their lives.

**Honors in Geomatics**
Undergraduate students may be recognized for exceptional performance by earning Departmental Honors in Geomatics. In order to receive honors in Geomatics, a student must meet each of the following requirements:

1. Complete all requirements for a BS in Geomatics.
2. Be an active member for at least one year of both a national and an on-campus student chapter of a professional geomatics society that addresses issues relevant to the geomatics profession.
3. Have a GPA of 3.50 or higher in their Geomatics and Geographic Information System courses of their catalog year. Have a GPA of 3.30 or higher for their overall cumulative GPA.
4. Pass the Fundamentals of Surveying Examination prior to the completion of the first semester of their senior year.
5. Document a minimum of eight weeks work experience while a student at the University of Alaska in a geomatics or geomatics related position.

**Advising**
All undergraduate students are encouraged to meet with their academic advisor each semester for the purpose of reviewing their academic progress and planning future courses. It is particularly important for students to meet with their advisor whenever academic difficulties arise. Students are encouraged to consult the faculty in the Department of Geomatics for assistance in designing their course of study to ensure that all prerequisites have been met and that university and major degree requirements are understood and followed.

**Preparation**
The university offers courses to help students without this preparation to meet the skill level required in the Geomatics program. Insufficient preparation will increase the number of semesters required to complete either degree. Students seeking the Undergraduate Certificate in Geographic Information Systems, the Associate of Applied Science or Bachelor of Science in Geomatics should prepare for entrance into the program by completing the following high school courses:

<table>
<thead>
<tr>
<th>Mathematics</th>
<th>Science</th>
<th>English Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algebra II</td>
<td>Physics</td>
<td>Skill level as demonstrated by ACT, SAT or approved placement test to qualify for enrollment in ENGL A111</td>
</tr>
<tr>
<td>Trigonometry</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Undergraduate Certificate, Geographic Information Systems (GIS)**

**Admission Requirements**
Satisfy the Admission to Certificate and Associate’s Degree Programs Requirements in Chapter 7, Academic Standards and Regulations.

**Course Requirements**
Certain courses require prerequisites or faculty permission. Call (907) 786-1972 for further information.

**Major Requirements**
In order to receive an Undergraduate Certificate in GIS, students must achieve a grade of C or higher in all courses applied to the certificate.

1. Complete the following required courses (23 credits):
   - GEO A137  Principles of Mapping  3
   - GEO A167  Remote Sensing and Image Analysis  4
   - GEO A460  Geomatics Design Project  3
   - GIS A268  Elements of Geographic Information Systems (GIS)  4
2. Complete 9 credits from the following elective courses:
   GEO A354  City and Regional Planning (3)
   GEO A490  Selected Advanced Topics in Geomatics (1-6)
   GIS A295  Internship in Geographic Information Systems I (3)
   or
   GIS A495  Internship in Geographic Information Systems II (3)
   GIS A369  Land Information Systems (3)
   GIS A370  GIS and Remote Sensing for Natural Resources (3)
   GIS A371  GIS Applications I (3)
   GIS A433  Coastal Mapping (3)
   GIS A468  Integration of Geomatics Technologies (3)
   GIS A471  GIS Applications II (4)
   GIS A490  Selected Advanced Topics in GIS (1-6)

3. A maximum of 3 credits of Internship (GIS A295 or GIS A495) and 3 credits of Advanced Topics in Geomatics (GEO A490) or Advanced Topics in GIS (GIS A490) can be counted toward the Certificate in GIS. Faculty approval of the GEO A490 or GIS A490 topic is necessary for application of the course to the certificate program.

4. A total of 32 credits is required for the Certificate in GIS.
Associate of Applied Science, Geomatics

Admission Requirements
Satisfy the Admission to Undergraduate Certificate and Associate’s Degree Programs Requirements in Chapter 7, Academic Standards and Regulations.

General University Requirements
Complete the Associate of Applied Science General Degree Requirements located at the beginning of this chapter. Some of the major requirements will also fulfill Associate of Applied Science degree general requirements. Students should coordinate choices carefully with their academic advisor in the Department of Geomatics.

Academic Progress
A student who is unable to earn a satisfactory grade in the major requirement courses during their initial enrollment may attempt to earn a satisfactory grade one additional time, on a space-available basis. ‘Satisfactory grade’ means a grade of C or better, as this is the usual requirement for pre-requisites in Geomatics courses (GEO and GIS). Failure to earn a grade of C or better on the second attempt may result in removal from the Geomatics program.

Major Requirements
1. Complete 4 credits in Physics:
   - PHYS A123 Basic Physics I (3)
   - PHYS A123L Basic Physics I Laboratory (1)
   - or
   - PHYS A211 General Physics I (3)
   - PHYS A211L General Physics I Laboratory (1)

2. Complete the following required courses (50 credits):
   - CSE A102 Introduction to Computer Systems 1
   - ENGL A212 Technical Writing 3
   - ENGR A161 Engineering Practices II 3
   - GEO A137 Principles of Mapping 3
   - GEO A146 Surveying Computations 3
   - GEO A155 Fundamentals of Surveying 3
   - GEO A157 Analytical and Digital Cartography 3
   - GEO A158 Geomatics Computer Fundamentals 1
   - GEO A167 Remote Sensing and Image Analysis 4
   - GEO A248 Digital Terrain Cartography 3
   - GEO A256 Municipal and Civil Geomatics 3
   - GEO A257 Elements of Photogrammetry 3
   - GEO A266 Advanced Surveying 3
   - GEO A267 Boundary Law I 4
   - GIS A268 Elements of Geographic Information Systems (GIS) 4
   - MATH A109 Precalculus † 6

3. Electives to total of 63 credits.

† MATH A107 College Algebra and MATH A108 Trigonometry (both courses) may be substituted for MATH A109 Precalculus.
Bachelor of Science, Geomatics

Admission Requirements
Complete the Admission to Baccalaureate Programs Requirements in Chapter 7, Academic Standards and Regulations.

Academic Progress
A student who is unable to earn a satisfactory grade in the major requirement courses during their initial enrollment may attempt to earn a satisfactory grade one additional time, on a space-available basis. ‘Satisfactory grade’ means a grade of C or better, as this is the usual requirement for pre-requisites in Geomatics courses (GEO and GIS). Failure to earn a grade of C or better on the second attempt may result in removal from the Geomatics program.

Graduation Requirements
A. General University Requirements
Complete the General University Requirements for all Baccalaureate Degrees at the beginning of this chapter.

B. General Education Requirements
Complete the General Education Requirements for Baccalaureate Degrees at the beginning of this chapter.

C. Major Requirements
1. Complete 4 credits in Physics from one of the following course pairs:
   - PHYS A123 Basic Physics I (3)
   - PHYS A123L Basic Physics I Laboratory (1)
   or
   - PHYS A211 General Physics I (3)
   - PHYS A211L General Physics I Laboratory (1)

2. Complete the following (21 credits):
   - CSE A102 Introduction to Computer Systems 1
   - ENGL A212 Technical Writing 3
   - ENGR A161 Engineering Practices II 3
   - GEO A158 Geomatics Computer Fundamentals 1
   - MATH A109 Precalculus † 6
   - MATH A272 Applied Calculus ◊ 3
   - STAT A253 Applied Statistics for the Sciences 4

   † MATH A107 College Algebra and MATH A108 Trigonometry (both) may be substituted for MATH A109 Precalculus.
   ◊ MATH A200 Calculus I may be substituted for MATH A272 Applied Calculus.

3. Complete all of the following (71 credits):
   - BA/JUST A241 Business Law I 3
   - GEO A137 Principles of Mapping 3
   - GEO A146 Surveying Computations 3
   - GEO A155 Fundamentals of Surveying 3
   - GEO A157 Analytical and Digital Cartography 3
   - GEO A167 Remote Sensing and Image Analysis 4
   - GEO A248 Digital Terrain Cartography 3
   - GEO A256 Municipal and Civil Geomatics 3
   - GEO A257 Elements of Photogrammetry 3
   - GEO A266 Advanced Surveying 3
   - GEO A267 Boundary Law I 4
   - GEO A301 Geomatics Professional Development I 1
   - GEO A302 Geomatics Professional Development II 1
   - GEO A303 Geomatics Professional Development III 1
   - GEO A355 Land Development and Design 3
   - GEO A359 Geodesy and Map Projections 3
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<th>Credits</th>
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<tr>
<td>GEO A365</td>
<td>Geomatics Adjustment and Analysis</td>
<td>4</td>
</tr>
<tr>
<td>GEO A457</td>
<td>Boundary Law II</td>
<td>4</td>
</tr>
<tr>
<td>GEO A460</td>
<td>Geomatics Design Project</td>
<td>3</td>
</tr>
<tr>
<td>GEO A466</td>
<td>Geopositioning</td>
<td>3</td>
</tr>
<tr>
<td>GIS A268</td>
<td>Elements of Geographic Information Systems (GIS)</td>
<td>4</td>
</tr>
<tr>
<td>GIS A366</td>
<td>Spatial Information Analysis and Modeling</td>
<td>3</td>
</tr>
<tr>
<td>GIS A468</td>
<td>Integration of Geomatics Technologies</td>
<td>3</td>
</tr>
<tr>
<td>PHIL A305</td>
<td>Professional Ethics</td>
<td>3</td>
</tr>
</tbody>
</table>

4. Complete at least 11 credits in one of the emphasis areas.

**Surveying Emphasis**

a. Complete the following (4 credits):

- GEO A433 Hydrographic Surveying 3
- PEP A110 Remote First Aid (1) 1
  or
- PEP A112 First Aid and CPR for Professionals (1)

b. Complete 7 credits from the following: 7

- GEO A354 City and Regional Planning (3)
- GEO A358 Programming for Digital Cartography (3)
- GEO A459 Geodetic Geomatics (3)
- GEO A467 Analytical and Digital Photogrammetry (3)
- GEO A490 Selected Advanced Topics in Geomatics (1-6)
- **GIS A367** GIS and Remote Sensing (3)
- GIS A369 Land Information Systems (3)
- GIS A371 GIS Applications I (3)
- GIS A433 Coastal Mapping (3)
- **GIS A458** Design and Management of Spatial Data (3)
- GIS A471 GIS Applications II (4)
- **GIS A490** Selected Advanced Topics in GIS (1-6)

**Geographic Information Systems (GIS) Emphasis**

a. Complete the following (3 credits):

- GIS A458 Design and Management of Spatial Data 3

b. Complete 8 credits from the following: 8

- GEO A354  City and Regional Planning (3)
- GEO A358  Programming for Digital Cartography (3)
- GEO A467  Analytical and Digital Photogrammetry (3)
- GEO A490  Selected Advanced Topics in Geomatics (1-6)
- GIS A367  GIS and Remote Sensing (3)
- GIS A369  Land Information Systems (3)
- GIS A370  GIS and Remote Sensing for Natural Resources (3)
- GIS A371  GIS Applications I (3)
- GIS A433  Coastal Mapping (3)
- GIS A471  GIS Applications II (4)
- GIS A490  Selected Advanced Topics in GIS (1-6)
- PEP A110 Remote First Aid (1)
  or
- PEP A112 First Aid and CPR for Professionals (1)
5. A total of 131 credits is required for the degree, of which 42 must be upper division.

FACULTY

Don Davis Jr., Professor Emeritus,  
Don Davis Jr., Professor/Chair, AFDD@uaa.alaska.edu
Gennady Gienko, Associate Professor, AFGG@uaa.alaska.edu ggienko@uaa.alaska.edu
Bill Hazelton, Associate Professor/Chair, AFBH3@uaa.alaska.edu nwhazelton@uaa.alaska.edu
Jeffery Hollingsworth, Assistant Professor, jphollingsworth@uaa.alaska.edu
<table>
<thead>
<tr>
<th>1a. School or College</th>
<th>1b. Department</th>
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</thead>
<tbody>
<tr>
<td>KP KPC</td>
<td>Business &amp; Industry</td>
</tr>
</tbody>
</table>

2. Complete Program Title/Prefix
   
   Associate of Applied Science, General Business

3. Type of Program
   
   Choose one from the appropriate drop down menu:

   - Undergraduate:
     - Associate of Applied Science
   - Graduate:
     - CHOOSE ONE

   This program is a Gainful Employment Program:  
   □ Yes or ☑ No

4. Type of Action:
   
   PROGRAM
   □ Add  ☑ Change  □ Delete
   
   PREFIX
   □ Add  □ Change  □ Inactivate

5. Implementation Date (semester/year)
   
   From: F/2013 To: 9999

6a. Coordination with Affected Units
   
   Department, School, or College: KPC
   
   Initiator Name (typed): Steve Horn
   Initiator Signed Initials: _________  Date:________________

6b. Coordination Email submitted to Faculty Listserv (uaa-faculty@lists.uaa.alaska.edu)
   
   Date: 2/1/2013

6c. Coordination with Library Liaison
   
   Date: 2/1/2013

7. Title and Program Description - Please attach the following:
   
   - ☑ Cover Memo
   - ☑ Catalog Copy in Word using the track changes function

8. Justification for Action
   
   The justification for this action is attached to the cover memo.

<table>
<thead>
<tr>
<th>Initiator (faculty only)</th>
<th>Date</th>
<th>Approved</th>
<th>Disapproved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steve Horn</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Initiator (TYPE NAME)</th>
<th>Date</th>
<th>Approved</th>
<th>Disapproved</th>
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<table>
<thead>
<tr>
<th>Department Chair</th>
<th>Date</th>
<th>Approved</th>
<th>Disapproved</th>
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<thead>
<tr>
<th>College/School Curriculum Committee Chair</th>
<th>Date</th>
<th>Approved</th>
<th>Disapproved</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
Associate of Applied Science, General Business

Kenai Peninsula College (KPC)
156 College Road, Soldotna, Alaska, 99669, (907) 262-0300
www.kpc.alaska.edu

Kodiak College (KOC)
117 Benny Benson Drive, Kodiak, Alaska 99615, (907) 486-1210
www.koc.alaska.edu

Matanuska-Susitna College (MSC)
8295 East College Drive (P.O. Box 2889)
Palmer, Alaska 99645, (907) 745-9774
http://matsu.alaska.edu

This two-year degree program provides a solid business foundation and preparation for career advancement. Graduates will be able to practice relevant business skills, meet the diverse needs of a business to achieve organizational goals, start and manage their own small business, communicate effectively, and/or manage their business affairs with professionalism, integrity, and a spirit of inquiry.

The specific student learning outcomes that arise from the program objectives and are the most central for the assessment of the program’s student learning outcomes are as follows.

1. Use critical thinking skills to solve problems and make decisions based on accepted business principles.
2. Understand the interrelationship of international and domestic business, societies, and governments.
3. Execute the four functions of management: planning, organizing, leading, controlling.
4. Apply effective communication skills in business settings.

Admission Requirements

Complete university admissions requirements for associate degrees found in Chapter 7, Academic Standards and Regulations.

General University Requirements

1. Complete the General University and the General Course Requirements for Associate of Applied Science Degrees located at the beginning of this chapter.
2. Complete the Associate of Applied Science General Course Requirements (15 credits) located at the beginning of this chapter. Of the courses needed to satisfy the General Course Requirements, one must be MATH A105 or higher.

Communication and General Course Requirements

Oral Communications Courses
Select 3 credits from the following: 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM A111</td>
<td>Fundamentals of Oral Communication</td>
<td>(3)</td>
</tr>
<tr>
<td>COMM A235</td>
<td>Small Group Communication</td>
<td>(3)</td>
</tr>
<tr>
<td>COMM A237</td>
<td>Interpersonal Communication</td>
<td>(3)</td>
</tr>
<tr>
<td>COMM A241</td>
<td>Public Speaking</td>
<td>(3)</td>
</tr>
</tbody>
</table>

Written Communication Courses
Select 6 credits from the following: 6

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL A111</td>
<td>Methods of Written Communication (required)</td>
<td>(3)</td>
</tr>
<tr>
<td>ENGL A211</td>
<td>Academic Writing About Literature</td>
<td>(3)</td>
</tr>
<tr>
<td>ENGL A212</td>
<td>Technical Writing</td>
<td>(3)</td>
</tr>
<tr>
<td>ENGL A213</td>
<td>Writing in the Social and Natural Sciences</td>
<td>(3)</td>
</tr>
</tbody>
</table>
CIOS A260A  Business Communications (3)

**Humanities* Social Sciences, Mathematics, Natural Sciences**

Select 6 credits from approved General Course Requirements: 6

MATH A105  Intermediate Algebra or higher level (required) (3)

and 3 more credits from an approved course

*Note: Any English courses used to satisfy humanities General Course Requirements must be different from the written communications requirement and have a course number higher than ENGL A111.

**Major Requirement Courses**

1. Complete the following required courses:
   - ACCT A201  Principles of Financial Accounting 3
   - ACCT A202  Principles of Managerial Accounting 3
   - BA A151  Introduction to Business 3
   - BA A231  Fundamentals of Supervision 3
   - BA/JUST A241  Business Law I 3
   - BA A260  Marketing Practices 3
   - CIS A110  Computer Concepts in Business 3
   - ECON A201  Principles of Macroeconomics 3
   - ECON A202  Principles of Microeconomics 3
   - LOGP A110  Logistics Information Systems & Customer Service 3

2. Major elective courses: 6 credits 6
   Advisor approved courses from the following programs:
   - ACCT, BA, CIS, CS, ECON

3. Electives: 9 credits 9

4. A total of 60 credits is required for the degree.

**FACULTY**

_Thomas Dalrymple, Assistant Professor, tdalrymp@uaa.alaska.edu_

_Kathrynn Hollis-Buchanan, Assistant Professor, khollis@kodiak.alaska.edu_

_Steve Horn, Assistant Professor, slhorn@kpc.alaska.edu_

_Holly Bell, Assistant Professor, hbell11@matsu.alaska.edu_

_Diedre Berberich, Assistant Professor, dberberich@matsu.alaska.edu_
Associate of Applied Science, General Business
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http://matsu.alaska.edu

This flexible, two-year degree provides a solid business foundation and prepares students for career advancement. It readies graduates to apply principles and skills relating to accounting, management, marketing, finance, economics, and business law to businesses of all sizes. Graduates will be able to practice relevant business skills, meet diverse business needs to achieve organizational goals, start and manage their own small businesses, communicate effectively, and conduct their business affairs with professionalism, integrity, and a spirit of inquiry.

This two-year degree program provides a solid business foundation and preparation for career advancement. Graduates will be able to practice relevant business skills, meet the diverse needs of a business to achieve organizational goals, start and manage their own small business, communicate effectively, and/or manage their business affairs with professionalism, integrity, and a spirit of inquiry.

The specific student learning outcomes that arise from the program objectives and are the most central for the assessment of the program’s student learning outcomes are as follows.

1. Use critical thinking skills to solve problems and make decisions based on accepted business principles.
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3. Execute the four functions of management: planning, organizing, leading, controlling.
4. Apply effective communication skills in business settings.

Admission Requirements
Complete university admissions requirements for associate degrees found in Chapter 7, Academic Standards and Regulations.

General University Requirements
1. Complete the General University and the General Course Requirements for Associate of Applied Science Degrees located at the beginning of this chapter.
2. Complete the Associate of Applied Science General Course Requirements (15 credits) located at the beginning of this chapter.
   Of the courses needed to satisfy the General Course Requirements, one must be MATH A105 or higher.

Communication and General Course Requirements
Oral Communications Courses
Select 3 credits from the following: 3
COMM A111 Fundamentals of Oral Communication (3)
COMM A235 Small Group Communication (3)
COMM A237 Interpersonal Communication (3)
COMM A241 Public Speaking (3)

Written Communication Courses
Select 6 credits from the following: 6
ENGL A111 Methods of Written Communication (required) (3)
ENGL A211 Academic Writing About Literature (3)
ENGL A212 Technical Writing (3)
ENGL A213 Writing in the Social and Natural Sciences (3)
CIOS A260A Business Communications (3)

Humanities* Social Sciences, Mathematics, Natural Sciences
Select 6 credits from approved General Course Requirements: 6
MATH A105 Intermediate Algebra or higher level (required) (3)
and 3 more credits from an approved course
*Note: Any English courses used to satisfy humanities General Course Requirements must be different from the written communications requirement and have a course number higher than ENGL A111.

Major Requirement Courses
1. Complete the following required courses:
   - ACCT A101 Principles of Financial Accounting I  3
   - ACCT A102 Principles of Financial Accounting II  3
   *ACCT A201 Principles of Financial Accounting  3
   - ACCT A202 Principles of Managerial Accounting  3
   - BA A151 Introduction to Business  3
   - BA A231 Fundamentals of Supervision  3
   - BA/JUST A241 Business Law I  3
   - BA A260 Marketing Practices  3
   - BA A264 Personal Selling  3
   - CIS A110 Computer Concepts in Business  3
   - ECON A201 Principles of Macroeconomics  3
   - ECON A202 Principles of Microeconomics  3
   - LOGP A 110 Logistics Information Systems & Customer Service  3
   *The ACCT A101 Principles of Financial Accounting I and ACCT A102 Principles of Financial Accounting II sequence may be used to satisfy the ACCT A201 requirement for this degree.

2. Major elective courses: 6 credits
   Advisor approved courses from the following programs:
   ACCT, BA, CIS, CS, ECON

3. Electives: 9 credits

4. A total of 60 credits is required for the degree.

FACULTY
Thomas Dalrymple, Assistant Professor, tdalrymp@kodiak.alaska.edu
Kathrynn Hollis-Buchanan, Assistant Professor, khollis@kodiak.alaska.edu
Ray Zagorski, Associate Professor, rzagorski@kodiak.alaska.edu
Steve Horn, Assistant Professor, shorn@kodiak.alaska.edu
Holly Bell, Assistant Professor, hbel11@matsu.alaska.edu
Diegri Berberich, Assistant Professor, dberberich@matsu.alaska.edu
Currently, UAA has no formal policies on academic program suspension or deletions. Our offices need to be able to give guidance to programs considering suspensions or deletions. The attached draft policies are designed to provide this guidance and address accreditation and Board of Regents requirements.

Input from the Policy Advisory Committee, the academic deans, and community campus directors have been incorporated into this draft, and we are submitting it to the academic boards for consideration.

The policies are designed to apply to a variety of purposes for program suspension and deletion, such as addressing temporary circumstances, making major program revisions, or deleting programs which have been suspended for several years.

We look forward to receiving your feedback on the draft.
Academic Program Suspension and Deletion Policies

When planning to suspend or delete an academic program, a number of considerations must be addressed to comply with the policies of the University of Alaska (UA) and the Northwest Commission on Colleges and Universities (NWCCU). These considerations include, but are not limited to, the impact on students currently enrolled in the program, the impact on the community in which the program is offered, and the impact on other academic programs in the University of Alaska System.

Academic Program Suspension of Admissions

There are a variety of reasons why program faculty and academic deans/campus directors consider suspending admissions to an academic program. These may include, among others, temporary circumstances (e.g., insufficient faculty to meet substantial enrollment increases), planned major revisions to the program (e.g., deleting a track or changing the degree level), or potential program deletion (discussed in greater detail in the next section).

Steps for Program Suspension (see Diagram 1)

1. **Program Suspension:** Academic dean/campus director submits a memo to the provost requesting suspension of admission. Requests for suspension should indicate the implementation date, reason for the suspension, planned duration, and identification of impacts on other UAA programs or departments. By the conclusion of the fifth year of suspension, programs must reinstate admission, request extension of suspension, or initiate the deletion process.
   a. For programs offered on a community campus, the applicable academic dean or campus director (as determined by the UAA Catalog chapter in which the program is published) should be notified prior to the suspension of the program. For programs offered on multiple campuses, each applicable dean or campus director should be notified prior to suspension of the program.

2. **UA System and Accreditation Notification:** Following the approval of program suspension by the provost, Academic Affairs will notify the Statewide Academic Council (SAC) and Northwest Commission on Colleges and Universities (NWCCU). Program suspensions require notification to these bodies, not approval.

3. **Administrative Logistics:** The following are non-curricular considerations for program deletion.
   a. The provost has final approval authority for program suspensions. Once approved by the provost, the request is forwarded to the registrar to formally suspend admissions. The chancellor is notified of the action before notification goes to SAC and the NWCCU.
   b. Personnel implications will be addressed in accordance with applicable collective bargaining agreements and personnel policies and regulations. Program funds will be assigned to other department, college, or institutional priorities through established processes.

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3 Decisions to limit enrollment or admission to a program are administrative decisions that do not require completion of this approval process.
4 In addition to addressing the potential impact of a program suspension on related academic units, this coordination provides an opportunity for the academic deans and campus directors to identify areas in which the units may work together to support the program planned for suspension.
Diagram 1: UAA Degree and Certificate Suspension Approval Process

Suspension Initiated by Faculty and/or College/School Academic Dean/Campus Director

Consult With Office of Academic Affairs

College/School Dean/Director

Coordination with Affected College/School Dean/Director for Programs Offered on Multiple Campuses & Community Campus Programs

OAA/Provost Approval

Northwest Commission on Colleges and Universities

Statewide Academic Council

Chancellor

Registrar

Programs Offered on One Campus
Academic Program Deletion

Program deletions may be initiated for a number of reasons. These may include, among others, low enrollment, few graduates, or changing job markets. After a period of suspension, and in conjunction with evidence collected from within and outside the institution, a decision can be made to modify, eliminate, or supersede the existing program with one more relevant. Considerations should include the impact on students currently enrolled in the program, on directly related employment sectors, and on other related departments within the university.

Steps for Program Deletion (see Diagram 2)

1. **Program Suspension:** Following the process described in the Program Suspension Policy, the academic dean/campus director submits a memo to the provost requesting suspension of admissions into the program, to ensure that no new students are admitted into the program until the final determination is made. Requests for suspension should indicate the implementation date, reason for the suspension, planned duration, and identification of impacts on other UAA programs or departments. By the conclusion of the fifth year of suspension, the deletion process must be initiated.
   a. For programs offered on a community campus, the applicable academic dean or campus director (as determined by the UAA Catalog chapter in which the program is published) should be notified prior to the suspension of the program. For programs offered on multiple campuses, each applicable dean or campus director should be notified prior to suspension of the program.

2. **Consultation with Academic Affairs:** To initiate the program deletion process, consultation with OAA must occur. This consultation will include a discussion of the process and an overview of the templates required for program deletion. OAA may waive or modify this requirement where appropriate, such as a program which has been suspended for more than five years with no currently enrolled majors.
   a. The process will address the rationale for the proposed deletion, the demand for the program, the impact and implications on academic departments in UAA and other Major Academic Units (MAUs), impacts on external stakeholders, the financial status of the program, and potential options to resolve the concerns which led to the proposed deletion.
   b. If the decision is to delete the program, programs must accommodate all currently admitted students with a completion plan that meets each student’s catalog deadlines and requirements. This completion plan should outline the timeframe and priorities for resources to accommodate completion of students impacted by the proposed program deletion.
   c. Proposals to delete programs offered on multiple campuses or through collaborative arrangements between two or more academic units should be coordinated with the academic deans and campus directors of the relevant program as is appropriate to their situations.

3. **Development of Proposal to Delete or Modify Program:** This proposal should be developed using the established curriculum approval process. If the department decides to modify the existing program, or to supersede it with a new program, the curriculum is developed as a program change so that deletion of the existing program and initiation of its replacement are approved simultaneously.

4. **UA System and Accreditation Approval:** Following the internal curriculum approval process, Academic Affairs will work with program faculty to submit program deletions for approval by the Statewide Academic Council (SAC), Board of Regents, and Northwest Commission on Colleges and Universities (NWCCU).
   a. Note: Authority to approve deletion of Occupational Endorsement Certificates and Workforce Credentials is delegated to the chancellor, and does not require action by SAC or the Board of

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5 In addition to addressing the potential impact of a program suspension on related academic units, this coordination provides an opportunity for the academic deans and campus directors to identify areas in which the units may work together to support the program planned for suspension.

6 See the Curriculum Handbook on the Governance site [http://www.ualaska.edu/governance/](http://www.ualaska.edu/governance/)
5. **Administrative Logistics:** The following are non-curricular considerations for program deletion.

   a. **Program Deletion from Banner:** When the program is deleted in Banner, students may no longer remain enrolled in the program, and the degree or certificate cannot be awarded. This administrative deletion will be postponed until there are no enrolled students in the major through graduation or expiration of admissions. Once approved by the NWCCU, the registrar will be notified to formally delete the program.

   b. **Personnel and Budget:** Personnel implications will be addressed in accordance with applicable collective bargaining agreements and personnel policies and regulations. Program funds will be assigned to other department, college, or institutional priorities through established processes.

   c. **Decisions Relative to Departments and Divisions:** This policy applies exclusively to academic programs. Decisions relative to departments and divisions will be managed within the college and institution through established processes.

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7 University Policy P10.04.020
Diagram 2: UAA Degree and Certificate Deletion Approval Process

Deletion Initiated by Faculty and/or College/School Dean/Director

Program Suspension
*(See suspension approval process for greater detail)*

- Consult With Office of Academic Affairs
- Develop Proposal Based on Relevant Considerations
- College/School Curriculum Committee
- College/School Dean/Director
- Governance Office
- Undergraduate Academic Board (UAB)
- Faculty Senate
- Graduate Academic Board (GAB)
- OAA/Provost
- Chancellor
- Statewide Academic Council
- UA President
- Board of Regents*
- Northwest Commission on Colleges and Universities
- Office of the Registrar

*Requires 60-day advance notice to have items placed on the agenda*
**Definitions**

**Academic Program:** A specific degree, certificate, or minor approved by the Board of Regents (BOR) and/or the Northwest Commission on Colleges and Universities (NWCCU), such as a Bachelor of Arts in English. Program levels include occupational endorsement certificates, undergraduate certificates, associate degrees, baccalaureate degrees, post-baccalaureate certificates, graduate certificates, master’s degrees, and doctoral degrees.

In some cases, a portion of an academic program (such as one of two tracks) may be suspended or deleted while other portions of the program remain available.

**Program Suspension:** While decisions relative to the program are made, admissions to the program are suspended. There are a variety of reasons for suspension. These may include, among others, temporary circumstances (e.g., insufficient faculty to meet substantial enrollment increases), planned major revisions to the program (e.g., deleting a track or changing the degree level), or potential program deletion. Program suspension requires notification to the Statewide Academic Council (SAC) and NWCCU.

**Program Deletion:** Program is scheduled for deletion, a teach-out process will be developed and communicated to majors, and the program will remain in the catalog until the teach-out process is complete. When program deletion is final, the program is no longer listed as an academic program, and no students may graduate or remain enrolled in the program. Program deletion requires approval by BOR and NWCCU.

**Approval:** The relevant decision making authority grants approval for the requested program action. The action cannot proceed until this approval has been received.

**Notification:** The relevant individual or body is notified of the approved program action. The body being notified does not have decision making authority over the action.
To: (Undergraduate or Graduate) Academic Board  
From: Faculty Initiator, Department  
Date:  
Re: Proposed Deletion of (Program Name and Degree or Certificate Level)

Please briefly address each of the following items. Please mark “not applicable” for any items which do not apply to the program. This cover memo should be no longer than one page.

Program Background: How long has the program been offered? If admission is currently suspended, please indicate the length of the suspension.

Justification for Program Deletion: Why is this program deletion proposed? Some examples might include enrollment trends, employment data, or shifting priorities within the department, school, or college.

Impact on Other Programs: How will the deletion affect other UA programs? Please include the GERs, programs on other campuses, and programs whose requirements include courses offered within the program proposed for deletion. How have you coordinated with those departments?

Impact on Students: How many students are currently enrolled (admitted to the program and taking classes)? How many students are currently admitted (admitted to the program but not currently taking classes)? How does the department plan to accommodate those students?

Impact on Stakeholders: Describe any input received from relevant stakeholders, such as industry advisory groups or communities served.

Plans for Program Deletion: What is the planned timeline for the deletion? Will the deleted program be replaced by a new or modified program?

This cover memo should accompany the Program Action Request (PAR) form submitted to curriculum bodies for program deletions. Catalog copy does not need to be submitted with program deletions.

This template is intended to meet the needs of the UAA curriculum bodies. Initiating faculty should contact Academic Affairs for assistance with the forms and approval processes for the Board of Regents and Northwest Commission on Colleges and Universities.

1 Please contact the Office of the Registrar (786-1560) for assistance identifying these data.
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February 15, 2013

To: Undergraduate Curriculum Board, Graduate Curriculum Board, College Curriculum Boards  
From: Lora Volden, University Registrar

Re: Concentrations, Tracks, Options, and Emphasis

Issue
Overtime more and more departments have added a concentration, track, option, or emphasis to their programs of study. Additionally, several programs have expressed the desire to indicate these on student transcripts and/or diplomas. In order to respond to the faculty, the Registrar’s Office first needs to better understand how these different terms are being applied at UAA.

Since currently we are unable to determine standard definitions or accepted requirements for these terms, I am asking the UAB, GAB, and the college curriculum committees for information about how they determine the appropriateness of one term over another. In addition to the decision making criteria of the particular boards and committees, I will appreciate any information you can gather from the different programs within your college.

What I need
I would appreciate feedback on the following:

- Is there a standard definition you have for
  - Concentration
  - Track
  - Option
  - Emphasis
- When do you use each? Is there certain criteria you look at?
- Are there implications associated with these terms that are tied to department accreditation?
- What else should we know that we aren’t asking?

If you have information on this that you would like to share I ask that you email me or if you prefer I would be happy to come to a future college curriculum meeting to listen and take notes. I would appreciate having this information before the end of this term (April 26).

Thank you in advance for your time.