Reedley College

CREDIT COURSE OUTLINE

I. COVER PAGE

(1) CSCI 41	(2) PROGRAMMING CONCEPTS AND METHODOLOGY II	(3) 4
Number	Title	Units

(4) Lecture / Lab Hours:			(8) Classification:		
Total Course Hours					
	Total Lec hours:	54.00		Degree applicable:	X
	Total Lab hours:	36.00		Non-degree applicable:	
	Total Contact hours:	90.00		Basic skills:	
Lec will generate __0__ hour(s) outside work.			(9) RC Fulfills AS/AA degree requirement: (area)		
Lab will generate __0__ hour(s) outside work.			Computer Familiarity		
			General education category:		
(5) Grading Basis:	Grading Scale Only		Major: COMPUTER SCIENCE		
	Pass/No Pass option	X	Certificate of:		
	Pass/No Pass only		Certificate in:		
(6) Advisories:					
			(10) CSU Baccalaureate:		X
Eligibility for English 125			(11) Repeatable: (A course may be repeated three times)		
Eligibility for English 126					0
(7) Pre-requisites(requires C grade or better): CSCI 40 or ENGR 40					
Corequisites:					

(12) Catalog Description:
This course introduces programming methodology, review of data types; linear and non-linear data structures which include lists, stacks, queues, trees, and files; implementation of data structures, recursion, searching, and sorting. C++ language is used.

II. COURSE OUTCOMES:

(Specify the learning skills the student demonstrates through completing the course and link critical thinking skills to specific course content and objectives.)

Upon completion of this course, students will be able to:
- A. Construct classic data structures used in all computer programs.
- B. Write programs using advanced programming concepts
- C. Analyze problems, design and develop computer programs to solve these problems.
- D. Debug and test programs.

III. COURSE OBJECTIVES:

(Specify major objectives in terms of the observable knowledge and/or skills to be attained.)

In the process of completing this course, students will:
- A. Write programs using object-oriented programming and the C++ language
- B. Define and use dynamic arrays, linked list, stacks and queue data structures
- C. Use string, stack and queue classes defined in C++ Standard Libraries
- D. Write programs using pointers, recursion and file manipulation techniques

E.   Understand and utilize binary search tree data structure.
F.   Identify and correct syntax and logical errors in computer programs
G.   Create proper test cases to test computer programs.
H.   Write a total of 1000 to 2000 lines of programs.

IV. COURSE OUTLINE:

Lecture Content:

Lecture Content:
A. Classes

1. Classes and Members
2. Constructors
3. Using a Namespace, Header file, and Implementation file
4. Operator Overloading

B. Container Classes

C. Pointers and Dynamic Memory

1. Pointers and arrays as parameters
2. A container class with a dynamic array
3. String class

D. Linked Lists

1. A fundamental node class for linked lists
2. A linked-list toolkit
3. A container class with a linked list

E. Software Development with Templates, Iterators, and the STL

1. Template functions
2. Template classes
3. Standard template classes and their iterators

F. Stacks

1. Stacks and the STL stack
2. Stack Applications

G. Queues

1. Queues and the STL queue
2. Queue Applications

H. Recursive

1. Recursive functions
2. Recursive Applications

I. Binary Search Trees

1. Binary Trees

2. Binary tree representations
3. Binary tree nodes
4. Binary tree traversals
5. Binary search trees

Lab Content:

Lab Content:

Program assignments practice following concepts and topics:

A. C++ fundamentals:

cin, cout, namespaces, header file, and implementation file

B. Classes

classes, member attributes, methods; Constructors; and Operator Overloading.

C. A container class using an array as a member attribute

D. A container class using a dynamic array

E. Implementation of a String class

F. A fundamental node class for linked lists

G. A linked-list toolkit

H. A container class with a linked list

I. Using Templates, Iterators, and the STL

J. Stacks

K. Queues

L. Recursive

M. Binary Search Trees

V. APPROPRIATE READINGS
Reading assignments may include but are not limited to the following:
    A.   Sample Text Title:
        1.   Recommended - Main & Savitch *Data Structures and Other Objects Using C++,* ed. 4 Addison Wesley, 2011, Programming assignments are included in the text
        2.   Recommended - Carrano & Prichard *Data Abstraction and Problem Solving with C++,* ed. 5 Addison-Wesley, 2007, Programming assignments are included in the text
        3.   Recommended - Goodrich, Tamassia, and Mount *Data Structures and Algorithms in C++,* ed. 2 Wiley, 2010, Programming assignments are included in the text
        4.   Recommended - Judy Scholl *Lab Manual: C++ Programming: From Problem Analysis to Program Design,* ed. 4 Course Technology, 2009,

B.   Other Readings
1.   Recommended - *Lab Handouts by Instructor*

___ Global or international materials or concepts are appropriately included in this course
___ Multicultural materials and concepts are appropriately included in this course

If either line is checked, write a paragraph indicating specifically how global/international and/or multicultural materials and concepts relate to content outline and/or readings.

VI. METHODS TO MEASURE STUDENT ACHIEVEMENT AND DETERMINE GRADES:

Students in this course will be graded in at least one of the following four categories. Please check those appropriate. A degree applicable course must have a minimum of one response in category A, B, or C.

A. Writing		
Check either 1 or 2 below		
X	*1. Substantial writing assignments are required. Check the appropriate boxes below and provide a written description in the space provided.*	
	2. Substantial writing assignments are NOT required. If this box is checked leave this section blank. For degree applicable courses you must complete category B and/or C.	
	a) essay exam(s)	X	d) written homework
	b) term or other paper(s)		e) reading reports
	c) laboratory report(s)	X	f) other (specify)

Required assignments may include but are not limited to the following:
Homework and programming writing examples:
• Design and implement simple classes
• Write implementation programs using user defined classes
• Write implementation programs using STL classes

B. Problem Solving			
Computational or non-computational problem-solving demonstrations, including:			
X	a) exam(s)		d) laboratory reports
	b) quizzes		e) field work
X	c) homework problems	X	f) other (specify):

Required assignments may include but are not limited to the following:
Exam and Homework problems:
• True/False questions
• Fill-in the blanks
• Identify and correct the errors in C++ statements
• Write sections of C++ code to perform certain tasks
Programming Examples:
Write a program, using linked lists, to do big-integer addition.

C. Skill demonstrations, including:			
	a) class performance(s)		c) performance exams(s)
	b) field work	X	d) other (specify)

Required assignments may include but are not limited to the following:
Write a program, using linked list, to do big-integer addition.
Write a program, using queues and stacks, to evaluate the value of an expression.

D. Objective examinations including:			
X	a) multiple choice	X	d) completion
X	b) true/false	X	e) other (specify):
	c) matching items		

COURSE GRADE DETERMINATION:

Description/Explanation: Based on the categories checked in A-D, it is the recommendation of the department that the instructor's grading methods fall within the following departmental guidelines; however, the final method of grading is still at the discretion of the individual instructor. The instructor's syllabus must reflect the criteria by which the student's grade has been determined. (A minimum of five (5) grades must be recorded on the final roster.)

If several methods to measure student achievement are used, indicate here the approximate weight or percentage each has in determining student final grades.

50% Examinations
40% Programming Projects
10% Homework

VII. EDUCATIONAL MATERIALS

For degree applicable courses, the adopted texts, as listed in the college bookstore, or instructor-prepared materials have been certified to contain college-level materials.

Validation Language Level (check where applicable):	College-Level Criteria Met	
	YES	NO
Textbook	X	
Reference materials		X
Instructor-prepared materials		X
Audio-visual materials		X

Indicate Method of evaluation:

Used readability formulae (grade level 10 or higher)	
Text is used in a college-level course	X
Used grading provided by publisher	
Other: (please explain; relate to Skills Levels)	

	YES	NO
Computation Level (Eligible for MATH 101 level or higher where applicable)	X	
Content		
Breadth of ideas covered clearly meets college-level learning objectives of this course	X	
Presentation of content and/or exercises/projects:		
Requires a variety of problem-solving strategies including inductive and deductive reasoning.	X	
Requires independent thought and study	X	
Applies transferring knowledge and skills appropriately and efficiently to new situations or problems.	X	

List of Reading/Educational Materials

Recommended - Main & Savitch *Data Structures and Other Objects Using C++,* ed. 4 Addison Wesley, 2011, Programming assignments are included in the text

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Comments:

	This course requires special or additional library materials (list attached).
X	This course requires special facilities: Computer Lab/ Computers and Printers

Attached Files:

<table>
<tr>
<td colspan="2">BASIC SKILLS ADVISORIES PAGE The skills listed are those needed for eligibility for English 125, 126, and Math 101. These skills are listed as the outcomes from English 252, 262, and Math 250. In the right hand column, list at least three major basic skills needed at the beginning of the target course and check off the corresponding basic skills listed at the left.</td>
</tr>
<tr>
<td>(eligibility for English 126)
(as outcomes for English 262)

__X__ Using phonetic, structural, contextual, and dictionary
      skills to attack and understand words.
__X__ Applying word analysis skills to reading in context.
__X__ Using adequate basic functional vocabulary skills.
__X__ Using textbook study skills and outlining skills.
__X__ Using a full range of literal comprehension skills and
      basic analytical skills such as predicting, inferring,
      concluding, and evaluating.</td>
<td>1. Students must read and understand a college level computer science text.

2. Students must read and understand software manuals.

3. Students must read and understand complex problem statements.</td>
</tr>
<tr>
<td>(eligibility for English 125)
(as outcomes for English 252)

__X__ Writing complete English sentences and avoiding
      errors most of the time.
__X__ Using the conventions of English writing: capitalization,
      punctuation, spelling, etc.
__X__ Using verbs correctly in present, past, future, and
      present perfect tenses, and using the correct forms of
      common irregular verbs.
__X__ Expanding and developing basic sentence structure with
      appropriate modification.
__X__ Combining sentences using coordination, subordination,
      and phrases.
__X__ Expressing the writer's ideas in short personal papers
      utilizing the writing process in their development.</td>
<td>1. Students must document their programs using written descriptions of their algorithms.

2. Students must take lecture notes.

3. Students must take written tests as part of the evaluation process.</td>
</tr>
<tr>
<td colspan="2">Check the appropriate spaces.
_____ Eligibility for Math 101 is advisory for the target course.
__X__ Eligibility for English 126 is advisory for the target course.
__X__ Eligibility for English 125 is advisory for the target course.
<i>   If the reviewers determine that an advisory or advisories in Basic Skills are all that are necessary for success in the target course, stop here, provide the required signatures, and forward this form to the department chair, the appropriate associate dean, and the curriculum committee.</i></td>
</tr>
</table>

CONTENT REVIEW
CSCI 40 PROGRAMMING CONCEPTS AND METHODOLOGY I
ENGR 40 Programming for Scientists and Engineers

REQUISITES

Subject Prerequisite -- CSCI 40 PROGRAMMING CONCEPTS AND METHODOLOGY I	
• Demonstrate knowledge of high level language syntax, control structures, looping, arrays, files, and records. • Demonstrate proper programming style, debugging and testing techniques. • Solve application problems in science and engineering.	• Write programs using object-oriented programming and the C++ language • Identify and correct syntax and logical errors in computer programs • Create proper test cases to test computer programs.

Subject Prerequisite -- ENGR 40 Programming for Scientists and Engineers	
• Demonstrate knowledge of high level language syntax, control structures, looping, arrays, files, and records. • Demonstrate proper programming style, debugging and testing techniques. • Solve application problems in science and engineering.	• Write programs using object-oriented programming and the C++ language • Identify and correct syntax and logical errors in computer programs • Create proper test cases to test computer programs.

ESTABLISHING PREREQUISITES OR COREQUISITES

Every prerequisite or corequisite requires content review plus justification of at least one of the seven kinds below. Prerequisite courses in communication and math outside of their disciplines require justification through statistical evidence. Kinds of justification that may establish a prerequisite are listed below.

Check one of the following that apply. Documentation may be attached.

1. _____ The prerequisite/corequisite is required by law or government regulations.
    Explain or cite regulation numbers:
2. _____ The health or safety of the students in this course requires the prerequisite.
    Justification: Indicate how this is so.
3. _____ The safety or equipment operation skills learned in the prerequisite course are required for the successful or safe completion of this course.
    Justification: Indicate how this is so.
4. _____ The prerequisite is required in order for the course to be accepted for transfer to the UC or CSU systems.
    Justification: Indicate how this is so.
5. _____ Significant statistical evidence indicates that the absence of the prerequisite course is related to unsatisfactory performance
    in the target course.
    Justification: Cite the statistical evidence from the research.
6. _____ The prerequisite course is part of a sequence of courses within or across a discipline.
7. __X__ Three CSU/UC campuses require an equivalent prerequisite or corequisite for a course equivalent to the target course:

CSU Fresno CSCI 41 CSCI 40
Cal Poly CSC 218 CSC 118
UCD ESC 40 ESC 30 or ESC 35