Reedley College

CREDIT COURSE OUTLINE

I. COVER PAGE

(1) ENGR 40   (2) Programming for Scientists and Engineers   (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		
(5) Grading Basis: Grading Scale Only			General education category:		
Pass/No Pass option	X		Major: ENGINEERING		
Pass/No Pass only			Certificate of:		
(6) Advisories:			Certificate in:		
Eligibility for English 125 or 126			(10) CSU Baccalaureate:		X
(7) Pre-requisites(requires C grade or better): MATH 4A MATH 4C			(11) Repeatable: (A course may be repeated three times)		0
Corequisites:					

(12) Catalog Description:

This course introduces the use of C programming language to solve engineering and applied science problems. A systematic development of program structure, specification, testing and debugging.

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:

    I. Formulate, represent, and solve problems using a high level programming language.
    II. Demonstrate knowledge of high level language syntax, control structures, looping, arrays, files, and records.
    III. Demonstrate proper programming style, debugging and testing techniques.
    IV. Solve application problems in science and engineering.

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:

    I. Write computer programs using a high level programming language (C Language)
    II. Write computer programs using selection and repetition control structures
    III. Write computer programs using pointer and array data structures
    IV. Write computer programs using functions
    V. Write computer programs to get input from files and write output to files.
    VI. Compile and link C programs to create executable programs
    VII. Identify and correct syntax and logical errors in computer programs
    VIII. Create proper test cases to test computer programs
    IX. Write a total of 500 to 1000 lines of programs.

IV. COURSE OUTLINE:

Lecture Content:

A. Introduction to Computers

     a. Computer organization and Operating Systems
     b. Machine languages, assembly languages and high-level languages
     c. C language, C standard library

B. Introduction to C Programming

     a. Memory Concepts
     b. Arithmetic in C
     c. Decision Making: Equality and Relational Operators

C. Structured Program in C

     a. Algorithms, Flowchart and Pseudocode
     b. "if", "if…else" selection statements
     c. "while" repetition statements
     d. Increment and decrement operators

D. C Program Control

     a. Counter Controlled and Sentinel Controlled Repetitions
     b. "for" repetition statement
     c. "do-while" repetition statement
     d. "switch" selection statement
     e. "break" and "continue" statements
     f. Logical operators

E. C Function

     a. Math library functions
     b. Function definitions, and prototypes
     c. Calling functions
     d. Random number generation
     e. Recursion

F. C Arrays

     a. Introduction to arrays
     b. Defining arrays
     c. Referencing array elements
     d. Passing arrays to functions
     e. Sorting and searching arrays
     f. Multiple-Subscripted arrays

G. C Pointers

     a. Define and initialize pointer variables
     b. Pointer operators (*, &)
     c. Calling functions by reference
     d. Pointer expressions and pointer arithmetic
     e. Relationship between pointers and arrays
     f. Arrays of pointers

H. C Characters and C Strings

     a. Fundamentals of strings and characters
     b. Character handling library
     c. String manipulation functions of the string handling library

I. C Structures and Enumerations

     a. Structure definitions and initialization
     b. Accessing members of structures
     c. Enumeration Constants

J. C File Processing

     a. Creating a sequential-access file
     b. Reading data from a sequential-access file

Lab Content:

Program assignments practice following concepts and topics:

    A. C language overview
    B. Using C Standard Library functions
    C. User defined functions
    D. Condition Control Structures
    E. Repetition structures
    F. Fundamental data structure - Arrays
    G. Text File Processing

V. APPROPRIATE READINGS

Reading assignments may include but are not limited to the following:

  I. Sample Text Title:
      1. Recommended - Etter *Engineering Problem Solving with C,* ed. 3 Pearson, 2005, Programming assignments are included in the text.
      2. Recommended - Deitel *C How to Program,* ed. 6 Prentice Hall, 2010, Programming assignments are included in the text.
      3. Recommended - Hanly and Loffman *Problem Solving & Program Design in C,* ed. 6 Pearson, 2009, Programming assignments are included in the text.

  II. 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) Computer Programs

Required assignments may include but are not limited to the following:
Writing Homework Example:
Formulate a pseudocode algorithm to obtain a series of positive numbers from the keyboard, and determine and display the sum of the numbers.

Writing Computer Program Example:
Write a C program to generate a table of conversions from inches to centimeters. Start the inches column at 0.0 and increment by 0.5 in. The last line should contain the value 20.0 in. (1 in = 2.54 cm)

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): Computer Programs

Required assignments may include but are not limited to the following:
Exam/Homework Problems
1. True/False questions
2. Fill-in the blanks
3. Identify and correct the errors in C statements
4. Write section of C code to perform a certain task

Programming Assignments
Write a program to calculate student grade point average (GPA).
Write a program to print a temperature conversion table (from Fahrenheit to Celsius)

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

Required assignments may include but are not limited to the following:
Programming skills:
* Develop algorithms through the process of top-down, stepwise refinement.
* Identify and debug syntax and logical errors in programs

D. Objective examinations including:			
X	a) multiple choice	X	d) completion
X	b) true/false	X	e) other (specify): identify and correct errors
	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.

Example #1 of a grading system
30% Exams
20% Final Projects
50% Weekly Homework and Programs

Example #2 of a grading system
50% Exams
10% Final Projects
20% Homework Assignments
20% Programming Lab Assignments

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 - Etter *Engineering Problem Solving with C,* ed. 3 Pearson, 2005, Programming assignments are included in the text.

Recommended - Deitel *C How to Program,* ed. 6 Prentice Hall, 2010, Programming assignments are included in the text.

Recommended - Hanly and Loffman *Problem Solving & Program Design in C,* ed. 6 Pearson, 2009, Programming assignments are included in the text.

Textbook C How to Program, 4th Edition, Deitel, 2004 (Programming assignments are included in the text) Problem Solving & Program Design in C, 4th Edition, Hanly and Koffman, 2004 (Programming assignments are included in the text) Engineering Problem Solving with C, 3rd Edition, Etter, 2005 (Programming assignments are included in the text) Lab Handouts by Instructor Personal computer/printer (school provided)

Comments:

	This course requires special or additional library materials (list attached).
X	Textbook C How to Program, 4th Edition, Deitel, 2004 (Programming assignments are included in the text) Problem Solving & Program Design in C, 4th Edition, Hanly and Koffman, 2004 (Programming assignments are included in the text) Engineering Problem Solving with C, 3rd Edition, Etter, 2005 (Programming assignments are included in the text) Lab Handouts by Instructor Personal computer/printer (school provided)
X	This course requires special facilities: Computer Lab / Computers and Printers

Attached Files:

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 <u>three</u> major basic skills needed at the beginning of the target course and check off the corresponding basic skills listed at the left.

(eligibility for English 125) (as outcomes for English 252)	1. Students must document their programs using written descriptions of their algorithms.

__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.
	2. Students must take lecture notes.
	
	3. Students must take written test as part of the evaluation process.

(eligibility for English 126) (as outcomes for English 262)	1. Students must read and understand a college level computer science text.

__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.
	2. Students must read and understand software manuals.
	
	3. Students must read and understand complex problem statements.

_____ Eligibility for Math 101 is advisory for the target course.
_____ Eligibility for English 126 is advisory for the target course.
_____ Eligibility for English 125 is advisory for the target course.

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.

CONTENT REVIEW

MATH 4C TRIGONOMETRY/PRECALCULUS

MATH 4A TRIGONOMETRY

REQUISITES

Subject Prerequisite -- MATH 4A TRIGONOMETRY

1. Students learn and use the concept of mathematical functions. 2. Students learn to use the six basic trigonometric functions of $\sin(x)$, $\cos(x)$, $\tan(x)$, $\cot(x)$, $\sec(x)$ and $\csc(x)$; and their inverse functions. 3. Students learn and use the concept of radian measure.	• Write computer programs using a high level programming language (C Language) • Write computer programs using functions • Create proper test cases to test computer programs

Subject Prerequisite -- MATH 4C TRIGONOMETRY/PRECALCULUS

1. Students learn and use the concept of mathematical functions. 2. Students learn to use the six basic trigonometric functions of $\sin(x)$, $\cos(x)$, $\tan(x)$, $\cot(x)$, $\sec(x)$ and $\csc(x)$; and their inverse functions. 3. Students learn and use the concept of radian measure.	• Write computer programs using a high level programming language (C Language) • Write computer programs using functions • 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, ECE 71 Pass ELM and Trigonometry
UCD, ECS 30 MATH 16A or MATH 21A
CSULB, CECS 174 MATH 117