CREDIT COURSE OUTLINE

I. COVER PAGE

(1) CSCI 45	(2) COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE PROGRAMMING	(3) 4
Number	Title	Units

(4)	Lecture / Lab Hours:			
	Total Course Hours			
		Total Lec hours:		54.00
		Total Lab hours:		36.00
		Total Contact hours:		90.00
	Lec will generate 0 hour(s) outside work.			
	Lab will generate 0 hour(s) outside work.			
(5)	Grading Basis:	Grading Scale Only		
		Pass/No Pass option		X
		Pass/No Pass only		
(6)	Advisories: *No defined advisories.*			
(7)	Pre-requisites(requires C grade or better): CSCI 41			
	Corequisites:			

(8)Classification:			
		Degree applicable:	X
		Non-degree applicable:	
		Basic skills:	
(9)RC	Fulfills AS/AA degree requirement: (area)		
		Computer Familiarity	
	General education category:		
	Major:	COMPUTER SCIENCE	
	Certificate of:		
	Certificate in:		
(10)CSU		Baccalaureate:	X
(11)Repeatable: (A course may be repeated three times)			0

(12) Catalog Description:
This course introduces functional organization of digital computers and low level programming; internal representation of data, binary arithmetic, machine instructions, addressing modes, subroutine linkage, macros and interrupts, and PC assembly language programming.

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. Utilize the functions of each computer hardware components.
II. Convert data between binary numbers and hexadecimal numbers.
III. Understand addressing mode, subroutine linkage, and interrupts.
IV. Write program using Assembly language.

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. Identify each of the computer hardware components
II. Convert a decimal number to binary, and hexadecimal formats; and vise-versa.
III. Add binary numbers
IV. Write a computer program using bitwise operators to manipulate the bits of integral operands (char, short, int, and long data types).
V. Implement interrupt handler in computer programs.
VI. Write programs processing strings.

IV. COURSE OUTLINE:

Lecture Content:

A. Computer Organization
(a) System Buses
(b) Internal/External Memory
(c) Input/Output
(d) Central Processing Unit

B. Data Representation

(a) Binary Numbers
(b) Hexadecimal Numbers
(c) Signed Numbers
(d) Character Storage

C. Assembly Language
(a) Assembly Language Instructions
(b) Constants, Statements
(c) Data Definition Directives
(d) Data Transfer Instructions
(e) Arithmetic Instructions
(f) Addressing Mode

E. Conditional Processing
(a) Boolean and Comparison Instructions
(b) Conditional Jumps
(c) Conditional Loops

F. Arithmetic
(a) Shift and Rotate Instructions
(b) Add, Subtract, and Multiply Instructions

G. String Processing

H. Disk Storage, File Processing

Lab Content:

Following topics in the lecture contents are practiced in lab sessions:

. Data representation
. Assembly language
. Conditional processing
. String Processing
. Arithmetic

V. APPROPRIATE READINGS

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

I. Sample Text Title:
1. Recommended - Irvine, K. *Assembly Language for x86 Processors,* ed. 6 Prentice Hall, 2011,
2. Recommended - Stallings, W. *Computer Organization & Architecture,* ed. 8 Pearson, 2010, Programming assignments are included in the text
3. Recommended - Juola, P. *Principles of Computer Organization and Assembly Language,* Prentice Hall, 2007,
4. Recommended - Patterson, D., Hennessy, J. *Computer Organization & Design,* ed. 3 Morgan Kaufmann, 2005, 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) Assembly Language Programs

Required assignments may include but are not limited to the following:
Example of a homework assignment
A less technically inclined friend has asked you to explain how computers work. Write a detailed, one-page description for your friend.

Example of a programming assignment
Write a program using assembly language to convert an ASCII decimal string to an integer.

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:
An example of homework and exam problem
Performance of Single-Cycle Machines
Assume the operation time for the major functional units in this implementation are the following:
• Memory units: 2 nanoseconds (ns)
• ALU and adders: 2 ns
• Register file (read or write): 1 ns
Assuming that the multiplexors, control units, PC accesses, sign extension unit, and wires have no delay, which of the following implementations would be faster and by how much?
1. An implementation in which every instruction operates in 1 clock cycle of a fixed length.
2. An implementation where every instruction executes in 1 clock cycle using a variable-length clock, which for each instruction is only as long as it needs to be.
To compare the performance, assume the following instruction mix: 24% loads, 12% stores, 44% R-format instructions, 18% branches, and 2% jumps.

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:
Example of programming assignments
• Write a program using assembly language to convert an ASCII decimal string to an integer.
• Write a program to multiply a by b, putting the result in c. Assume that memory location one contains the number 1. Assume that a and b are greater than 0 and that it's OK to modify a or b.

D. Objective examinations including:			
X	a) multiple choice	X	d) completion
X	b) true/false	X	e) other (specify): calculations
	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% Test
40% Programming Assignments
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)	

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 - Irvine, K. *Assembly Language for x86 Processors,* ed. 6 Prentice Hall, 2011,

Recommended - Stallings, W. *Computer Organization & Architecture,* ed. 8 Pearson, 2010, 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

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

Check the appropriate spaces.

_____ 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.

REQUISITES

Subject Prerequisite -- CSCI 41 PROGRAMMING CONCEPTS AND METHODOLOGY II

- Construct classic data structures used in all computer programs.
- Write programs using advanced programming concepts
- Analyze problems, design and develop computer programs to solve these problems.
- Write a computer program using bitwise operators to manipulate the bits of integral operands (char, short, int, and long data types).
- Implement interrupt handler in computer programs.
- Write programs processing strings.

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:

UC Davis ECS 50 ECS 40
Cal Poly SLO CSC215 CSC218
CSU Chico CSCI 51A CSCI 15B