Curriculum proposal number 2006.04

Curriculum Action Request (CAR) (Form 4-93) - Maui Community College

1. Author(s) Sandra R. Swanson
2. Authors' unit(s) Science, Technology, Engineering, & Mathematics (STEM)
3. Date submitted to Curriculum Committee 15 Sep 2006
4. a. General type of action? ☑ course ☐ program
   b. Specific type of action

Addition
- ☐ regular
- ☐ experimental
- ☐ other (specify)

Modification
- ☐ number/alpha
- ☐ title
- ☐ credits
- ☑ description ✓
- ☐ prerequisites
- ☐ corequisites
- ☐ program
- ☑ other (specify) ✓ Rec prep

5. Reason for this curriculum action

   To bring course in systemwide alignment with other UH campuses

6. Existing course

ICS	211	Introduction to Computer Science II	3
alpha	number	title	credits

7. Proposed new/modified course

ICS	211	Introduction to Computer Science II	3
alpha	number	title	credits

8. New course description or page number in catalog of present course description, if unchanged.

   Reinforce and strengthen problem-solving skills using more advanced features of programming languages and algorithms such as recursion, pointers, and memory management. Emphasize the use of data structures such as arrays, lists, stacks, and queues.

(Meets ... yes GE

9. Prerequisite(s)

   ICS 111 with at least a "C" or consent.

10. Corequisite(s)

    None

11. Recommended preparation

    Math 135 or Math 155

12. Is this course cross-listed? ☐ yes ☑ no If yes, list course

13. Student contact hours per week. 3

14. Class format (enter one of the following: lecture, lab, lecture/lab, other) _____
If other explain.
Lecture/laboratory

15. What method of delivery should be used for this course?
☑ traditional classroom ☑ HITS (interactive TV) ☐ cable ☑ on-line
☑ any of these ☐ other, explain,

16. Revise current MCC General Catalog page(s) 118

17. Course grading ☐ letter grade only ☐ credit/no credit ☑ either ☑ audit

18. Proposed semester and year of first offering? Fall semester 2007 year

19. Maximum enrollment 24 Rationale, if applicable
Maximum number of computers in computer laboratory.

20. Special scheduling considerations? ☑ yes ☐ no
If yes, explain.
Requires availability of appropriately equipped computer laboratory.

21. Special fees required? ☐ yes ☑ no
If yes, explain.

22. Will this request require special resources (personnel, supplies, etc.?) ☑ yes ☐ no
If yes, explain.
Computers with Java Software Development Toolkit (SDK) and appropriate programming development environment.

23. Is this course restricted to particular room type? ☑ yes ☐ no
If yes, explain.
Computers with Java Software Development Toolkit (SDK) and appropriate programming development environment.

24. ☐ Course fulfills requirement for _____ program/degree
☑ Course is an elective for ECET _____ program/degree
☑ Course is elective for AA degree

25. This course ☐ increases ☐ decreases ☑ makes no change in number of credit required for the program(s) affected by this action

26. Is this course taught at another UH campus? ☑ yes ☐ no

a. If yes, specify campus, course, alpha and number

UHH: CS 151 Introduction to Software Development
UHM: ICS 211 Introduction to Computer Science II
HonCC: ICS 211 Introduction to Computer Science II
KapCC: ICS 211 Introduction to Computer Science II
LeeCC: ICS 211 Introduction to Computer Science II

b. If no, explain why this course is offered at MCC

27. a. Course is articulated at

☑ UHCC ☑ UH Manoa ☑ UH Hilo ☐ UH WO ☐ Other/PCC

b. Course is appropriate for articulation at

☐ UHCC ☐ UH Manoa ☐ UH Hilo ☐ UH WO ☐ Other/PCC

c. Course is not appropriate for articulation at

☐ UHCC ☐ UH Manoa ☐ UH Hilo ☐ UH WO ☐ Other/PCC

d. Course articulation information is attached? ☑ yes ☐ no

Proposed by

SEP 08 2006

Author or Program Coordinator/Date

Requested by

SEP 08 2006

Division or Unit Chair/Date

Recommended by

13 Nov 06

Curriculum Chair/Date

Approved by

12/8/06

Academic Senate Chair/Date

12/28/06

Chief Academic Officer/Date

1/11/07

Chancellor/Date

Revised Feb 2005/AC

Revised for automated completion: Apr 2005/ss

Maui Community College
Course Outline

1. Alpha and Number — ICS 211

   Course Title — Introduction to Computer Science II

   Credits — 3

   Date of Outline — 15 Sep 2006

2. Course Description — Reinforce and strengthen problem-solving skills using more advanced features of programming languages and algorithms such as recursion, pointers, and memory management. Emphasize the use of data structures such as arrays, lists, stacks, and queues.

3. Contact Hours/Type — Lecture/Laboratory

4. Prerequisites — ICS 111 with at least a "C" or consent.

   Corequisites — None

   Recommended Preparation — Math 135 or Math 155

Approved by _____ Date 1/24/07

5. General Course Objectives

Students will build upon the basics learned in ICS 111 and develop useful, robust, and efficient computer programs and applications. The attributes of data structures will be explored and applied to a variety of programatic situations. Advanced programming techniques such as recursion will be investigated. Program efficiency metrics are introduced and incorporated. Algorithmic development skills will be expanded and their importance reinforced.

6. Student Learning Outcomes

For assessment purposes, these are linked to #7. Recommended Course Content.
Upon successful completion of this course students will be able to:

1. Recognize the use of arrays, lists, stacks, queues, and other data structures.
2. Select the appropriate searching or sorting algorithm based on the algorithm's behavior.
3. Develop recursive algorithms and programs.
4. Select appropriate data structure for a given application.
5. Use advanced object-oriented programming techniques (polymorphism, inheritance, and encapsulation) and standard libraries.
6. Produce robust programs using exception handling and extensive program testing.
7. Create simple graphical user interface (GUI) program.

7. Recommended Course Content and Approximate Time Spent on Each Topic

Linked to #6. Student Learning Outcomes.

1. (2 - 4 weeks) Recognize the use of arrays, lists, stacks, queues, and other data structures. (1, 2, 3, 4)
    a. Select the appropriate searching or sorting algorithm based on the algorithm's behavior.
        1) Illustrate data types and characterize them.
            a) Data types.
            b) Characteristics.
        2) Explain how data types are used in program control and corresponding potential pitfalls.
            a) Stacks.
            b) Queues.
            c) Use of pointers.
        3) Demonstrate use of data structures by writing classes and incorporating built-in classes/libraries.
            a) Data structures.
            b) Packages/libraries.
            c) Write classes.
2. (3 - 4 weeks) Select the appropriate searching or sorting algorithm based on the algorithm's behavior. (1, 2, 3, 4)
        a. Sorting algorithms (e.g.: selection sort, insertion sort, bubble sort, quick sort).
        b. Searching algorithms (sequential vs. binary).
3. (2 - 3 weeks) Develop recursive algorithms and programs. (1, 3)
    a. Recursion concept.
    b. Recursion implementation.
    c. Iterative vs. recursive efficiency.
4. (3 - 4 weeks) Select appropriate data structure for a given application. (1, 4, 5, 6)
    a. Performance characteristics of array and
        1) Performance evaluation.
    b. Problem characteristics to determine provides best representation.
        1) Problem analysis for data structure

5. (3 - 4 weeks) Use advanced object-oriented programming inheritance and standard libraries. (1, 4, 5, 6)
    a. Inheritance.
    b. Standard libraries.
    c. Library organization.
6. (3 - 4 weeks) Produce robust programs using exception program testing. (1, 4, 6, 7)
    a. Exception handling.
    b. Program testing techniques.
    c. Testing design strategies.
    d. Defensive programming.
7. (2 - 3 weeks) Create simple graphical user interface. (5, 6, 7)
    a. Good user interface design.
    b. Library GUI objects.
    c. Event-driven programming paradigm.

8. Text and Materials, Reference Materials, Auxiliary Materials and Content

Appropriate text(s) and materials, i.e., Data Structures and the Java Collections Framework, Collins, William J., will be chosen at the time the course is to be offered from those currently available in the field.

9. Recommended Course Requirements and Evaluation

Formative and summative assessments: Students may be asked to take written or oral quizzes and examinations to assess their understanding of the various learning outcomes.

25 - 60%: Assignments & programming exercises.
15 - 30%: Examinations.
10 - 25%: Quizzes.
5 - 15%: Class capstone programming project
5 - 10%: Class & laboratory participation.

10. Methods of Instruction

Lecture / Discussion / Laboratory

Assessment of Intended Student Learning Outcomes Standards – CCOWIQs with Ratings for ICS 211

Key:

3 = Major Emphasis: The student is actively involved (uses, reinforces, applies, and evaluated) in the student learning outcomes. The learner outcome is the focus of the class.

2 = Moderate Emphasis: The student uses, reinforces, applies and is evaluated by this learner outcome, but it is not the focus of the class

1 = Minor Emphasis: The student is provided an opportunity to use, reinforce, and apply this learner outcome, but does not get evaluated on this learner outcome

0 = No Emphasis: The student does not address this learner outcome

Standard 1: Written Communication	ICS 211
Write effectively to convey ideas that meet the needs of specific audiences and purposes.	
1.1 Use writing to discover and articulate ideas	3
1.2 Identify and analyze the audience and purpose for any intended communication	1
1.3 Choose language, style and organization appropriate to particular purposes and audiences	2
1.4 Gather information and document sources appropriately	1
1.5 Express a main idea as a thesis, hypothesis, and other appropriate content	0
1.6 Develop a main idea clearly and concisely with appropriate content	1
1.7 Demonstrate mastery of the conventions of writing, including grammar, spelling, and mechanics	2
1.8 Demonstrate proficiency in revision and editing	0
1.9 Develop a personal voice in written communication	0
Standard 2: Quantitative Reasoning	
Synthesize and articulate information using appropriate mathematical methods to solve problems and logically address real-life situations.	
2.1 Apply numeric, graphic and symbolic skills and other forms of quantitative reasoning, accurately and appropriately	3
2.2 Demonstrate mastery of mathematical concepts, skills, and applications, using technology when appropriate	3
2.3 Communicate clearly and concisely the methods and results of quantitative problem solving	3
2.4 Formulate and test hypotheses using numerical experimentation	3
2.5 Define quantitative issues and problems, gather relevant information, analyze that information, and present results	3
2.6 Assess the validity of statistical conclusions	1
Standard 3: Information Retrieval and Technology (Information Literacy)	
Access, evaluate, and utilize information effectively, ethically and responsibly.	
3.1 Use print and electronic information technology ethically and responsibly	2
3.2 Demonstrate knowledge of basic vocabulary, concepts, and operations of information technology and retrieval	1
3.3 Recognize, identify, and define an information need	1
3.4 Access and retrieve information through print and electronic media, evaluating the accuracy and authenticity of that information	1
3.5 Create, manage, organize, and communicate information through electronic media	2
3.6 Recognize changing technologies and make informed choices about their appropriateness and use.	3
Standard 4: Oral Communication	
Practice ethical and responsible oral communications appropriate to a variety of audiences and purposes.	
4.1 Identify and analyze the audience and purpose of any intended communication.	0
4.0 Gather, evaluate, select, and organize information for the communication.	0
4.3 Use language, techniques, and strategies appropriate to the audience and occasion.	0
4.4 Speak clearly and confidently, using the voice, volume, tone, and articulation appropriate to the audience and occasion	0
4.5 Summarize, analyze, and evaluate oral communications and ask coherent questions as needed.	0
4.6 Use competent oral expression to initiate and sustain discussion.	0
Standard 5: Critical Thinking	
Apply critical reasoning skills to effectively address the challenges and solve problems.	
5.1 Identify and state problems, issues, arguments, and questions contained in a body of information.	3
5.0 Identify and analyze assumptions and underlying points of view relating to an issue or problem.	3
5.3 Formulate research questions that require descriptive and explanatory analyses.	3
5.4 Recognize and understand multiple modes of inquiry, including investigative methods based on observation and analysis.	1
5.5 Evaluate a problem, distinguishing between relevant and irrelevant facts, opinions, assumptions, issues, values, and biases through the use of appropriate evidence.	3
5.6 Apply problem-solving techniques and skills, including the rules of logic and logical sequence.	2
5.7 Synthesize information from various sources, drawing appropriate conclusions.	1

5.8 Communicate clearly and concisely the methods and results of logical reasoning.	3
5.9 Reflect upon and evaluate their thought processes, value system, and world views in comparison to those of others.	1