Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

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Proposing Department/Unit Computer Science	Phone 7-4478

Check all appropriate lines and complete all information. Use a separate cover sheet for each course proposal and/or program proposal.

1. Course Proposals (check all that apply)

- [✓] New Course
- [ ] Course Prefix Change
- [ ] Course Deletion
- [ ] Course Revision
- [ ] Course Number and/or Title Change
- [ ] Catalog Description Change

Current course prefix, number and full title: COSC 108 Introduction to Programming via Alice

Proposed course prefix, number and full title, if changing:

2. Liberal Studies Course Designations, as appropriate
This course is also proposed as a Liberal Studies Course (please mark the appropriate categories below)

- [ ] Learning Skills
- [ ] Knowledge Area
- [ ] Global and Multicultural Awareness
- [ ] Writing Across the Curriculum (W Course)

- [ ] Liberal Studies Elective (please mark the designation(s) that applies – must meet at least one)

- [ ] Global Citizenship
- [ ] Information Literacy
- [ ] Oral Communication
- [ ] Quantitative Reasoning
- [ ] Scientific Literacy
- [ ] Technological Literacy

3. Other Designations, as appropriate

- [ ] Honors College Course
- [ ] Other: (e.g. Women's Studies, Pan African)

4. Program Proposals

- [ ] Catalog Description Change
- [ ] Program Revision
- [ ] Program Title Change
- [ ] New Track
- [ ] New Degree Program
- [ ] New Minor Program
- [ ] Liberal Studies Requirement Changes
- [ ] Other

Current program name:_____

Proposed program name, if changing:_____

5. Approvals

	Signature	Date
Department Curriculum Committee Chair(s)	*T. P. I.*	2/6/12
Department Chairperson(s)	*Wm. Oglib*	2/10/2012
College Curriculum Committee Chair	*Ann Koch*	3/7/12
College Dean	*Dean Smith*	3/12/12
Director of Liberal Studies (as needed)		
Director of Honors College (as needed)		
Provost (as needed)		
Additional signature (with title) as appropriate		
UWUCC Co-Chairs	*Gail Sechrist*	4/3/12

New Course Proposal - Computer Science Curriculum

Part II. Description of Curriculum Change

1. Syllabus of Record

I.   Catalog Description

COSC108   Introduction to Programming via Alice   3c-0l-3cr

This course provides an introduction to the development of algorithmic solutions to a variety of problems and the development of computer programs to implement the solutions. The Alice programming language and interactive development environment is incorporated to introduce fundamental algorithmic/programming concepts including variables, assignments, conditionals, loops, functions, and arrays through an interactive movie animation paradigm. These concepts are then applied to a standard programming language. Course includes an introduction to the Java programming language. (Students may not receive credit for both COSC 108 and 110.)

II.   Course Outcomes

Upon successful completion of this course, the student will be able to:

A.   Use an integrated programming environment.

B.   Develop algorithms from user problem statements.

C.   Express/interpret the design of solutions to computer oriented problems in various forms (e.g., flowcharts pseudo code, storyboards).

D.   Proficiently transform designs of problem solutions into Alice programming code.

E.   Use these programming elements: variable declaration, use of data types and simple data structures (arrays and objects), decision structures, loop structures, basic input and output, basic inheritance, and methods.

F.   Apply debugging and testing techniques to locate errors and determine the effectiveness of a program.

G.   Apply good programming practices including modular design approaches, mnemonic naming, use of documentation, and avoidance of excessive branching.

H.   Develop elementary programs using the Java programming language.

I.   Use the correct syntax for a subset of the Java programming language.

J.   Give commands to compile and run their own Java programs, including using common options.

III.   Detailed Course Outline

A. Introduction to Alice and Alice Concepts   3 hours
    1.   Introduction to Alice
    2.   Introduction to program design
    3.   Introduction to program implementation
    4.   Alice programming environment

B. Animation- an Introduction to Methods   3 hours
    1.   Scenarios and storyboards
    2.   Object methods to define behavior/animation
    3.   World-level methods
    4.   Positioning the camera
    5.   3D concepts

C. Variables, Expressions, and Functions   3 hours
    1. Method/Property variables
    2. Assignment and expressions
    3. Functions
    4. Parameters

D. Flow Control   3 hours
    1. Boolean functions, variables, and operators.
    2. Pseudo code and flow charts
    3. Control structures: if, if/else, for, and while.

E. Lists and Arrays   3 hours
    1. Lists
    2. Arrays

F. Interaction: Events and Event Handling   3 hours
    1. Interactive programming
    2. Events
    3. Handling mouse clicks
    4. Handling key presses
    5. Transitional effects

G. Student Animation Presentations   1 ½ hours

H. Mid-term exam   1 ½ hours

I. From Alice to Java   3 hours
    1. Introduction to Java
    2. Writing, compiling, running, and testing a Java program
    3. Java basics
    4. Design, implementation, and testing revisited

J. Java Types and Expressions   3 hours
    1. Variables
    2. Primitive data types
    3. Reference types
    4. Expressions
    5. Computation

K. Methods   3 hours
    1. Methods
    2. Method libraries
    3. Instance methods
    4. Program design revisited

L. Flow Control in Java   3 hours
    1. If, if/else, and switch
    2. While/do loops
    3. For loops
    4. Programming conventions revisited

M. Java Input and Output   3 hours
   1. Reading a file
   2. Writing a file
   3. Handling exceptions

N. Arrays and Lists in Java   3 hours
   1. Arrays
   2. Multi-dimensional arrays
   3. Lists (linked and array based)

O. Introduction to Object Oriented Programming   3 hours
   1. Object oriented design
   2. Inheritance
   3. Class hierarchies
   4. Simple GUI objects

Total   (42 hours)
Final   (2 hours)

IV. Evaluation Method

40%   Examinations. One mid-term exams and the final - each consisting primarily of multiple choice, true-false, and short answer questions.

10%   Animation presentation. Develop and present one animated movie/game using Alice.

30%   Programming assignments. There are approximately nine (six with Alice, and three Java) programming assignments worth varying numbers of points that collectively count this portion of grade.

20%   Class participation and quizzes. This may be based on written questions, verbal discussions, computer lab sessions, or other form of interaction.

Suggested Grading Scale: 90-100% A, 80-89% B, 70-79% C, 60-69% D, 0-59% F

V. Undergraduate Attendance Policy

Class attendance is regarded as being very important. Individual faculty may establish penalties for excessive number of unexcused absences. Excused absences will be allowed for illness, family emergencies, and involvement in university activities, such as sports. The penalties specified will meet university guidelines and be distributed to students with the course syllabus on the first day of class.

VI. Textbook

<u>Alice in Action with Java</u>, Joel Adams, Course Technology, *2008. ISBN 1-4239-0096-0*

VII. Special Resource Requirements

None.

2. Course Analysis Questionnaire

A. Details of the Course

A1. This course is an alternative to COSC 110 that uses the Alice teaching tool, developed by Carnegie Mellon University, to teach the basics of programming. Alice provides a new pedagogy for teaching introductory computer science course and has been adopted by many teaching institutions. This course achieves similar course outcomes to COSC 110. Therefore, this course is recommended for students taking a minor in Computer Science or Information Assurance whose major is Communications Media or Criminology as an alternative to COSC 110. Likewise, this course is recommended for Mathematics Education majors as an alternative to COSC 110. Other departments may have interest in this course in that it provides a path into programming which attains a higher degree of success with students lacking a technical background and would otherwise be "at risk". This course is not intended to be a Liberal Studies course.

A2. COSC 210 will change the prerequisite of "COSC 110" to "COSC 108 or COSC 110". The two following minor revisions need to be made:

Criminology Information Assurance Minor
Required Courses – Change "COSC 110" to "COSC 108 or COSC 110".
Note (3) – Change "Computer Science majors cannot count COSC 110" to "Computer Science majors cannot count either COSC 108 or COSC 110"

Computer Science Information Assurance Minor
Required Courses – Change "COSC 110" to "COSC 108 or COSC 110".
Note (3) – Change "Computer Science majors cannot count COSC 110" to "Computer Science cannot count either COSC 108 or COSC 110"

Minors are required to take one of COSC 210, 220, or 300. Change in pre-requisite to COSC 210 is sufficient as pre-requisite to COSC 220 and COSC 300 currently states COSC 110 or equivalent.

A3. This course has been offered as a special topic course (281) in the fall 2009 and fall 2010 semesters.

A4. This course is not intended to be dual level.

A5. This course is not to be taken for variable credit.

A6. Content is covered in courses offered at the following institutions, among others:
Boise State University: Introduction to Programming Concepts
Santa Clara University: Introduction to Programming
Drury University: Explorations in Computer Programming
Slippery Rock University: Introduction to Programming Principles, Alice and Java
Trinity University: Introduction to Programming Logic
Lock Haven University: Introduction to Computing and Problem Solving

A7. Use of Alice is endorsed by the ACM Special Interest Group on Computer Science Education (SIGCSE) as a possible first level programming course. SIGCSE is the internationally accepted forum for educators to discuss issues related to the development, implementation, and/or evaluation of computing programs, curricula, and courses, as well as syllabi, laboratories, and other elements of teaching and pedagogy.

B.   Interdisciplinary Implications

B1. This course will be taught by one instructor.

B2. The content of this course meets similar objectives to those of COSC 110 and is intended to be taken exclusive of COSC 110.

B3. This course is not cross-listed.

C.   Implementation

C1. No additional faculty member is required to teach this course. Being a lower level course, numerous faculty are able to teach this course. This course will initially be offered every other semester. It is anticipated that the initial population of students will be minors and other non majors that would otherwise take COSC 110. Thus, this course will replace one section of COSC 110 in semesters in which it is offered. This course has already been offered three times as a COSC 281. It will be counted as one preparation and three hours of equated workload.

C2. Other resources:
    a.   Current space allocations are adequate to offer this course.
    b.   No special equipment is needed for this course.
    c.   Current laboratories are sufficient for this course.
    d.   Library holdings are adequate.
    e.   The Alice teaching tool is distributed free of charge by Carnegie Mellon University.

C3. No grant funds are necessary to provide supplementary materials.

C4. This course will be offered every other semester.   This course may be offered in Summer sessions depending on demand.

C5. Multiple sections may be offered at a time depending on demand.

C6. Up to 30 students can be accommodated in this class in which students do a considerable amount of programming.

C7. No professional society recommends enrollment limits or parameters for this course.

C8. This course does not involve the use of distance education.

D.   Miscellaneous

No additional information is necessary

E. Letters of Support/Acknowledgement

The Computer Science Department will contact the following departments and programs requesting letters of support or acknowledgment for the COSC 108 proposal:

> Department of MIS and Decision Sciences
> Department of Technology Support and Training
> Department of Biology
> Program of Biochemistry
> Department of Communications Media
> Department of Criminology
> Department of Geoscience
> Department of Mathematics
> Department of Physics
> Program of Natural Science/Pre-Engineering

Indiana University of Pennsylvania

Mathematics Department
233 Stright Hall
210 South Tenth Street
Indiana, Pennsylvania 15705-1072
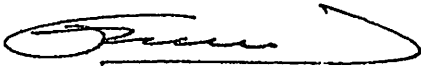
Voice: 724-357-2608
ax: 724-357-7908
Internet: *http://www.math.iup.edu*

March 15th, 2011
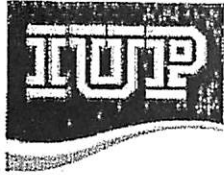
Dr. Charles Shubra
Professor and Chair
Computer Science Department

I write this letter in support of the proposed new computer science course (COSC 108) of programming with Alice. At our most recent department meeting, the Secondary Education Curriculum Committee recommended that upon approval of the new course we move to revise the B.S. Ed. in Secondary Mathematics Education program to allow either COSC 108 or COSC 110 as a programming course in the program.

The majority of the faculty in the department are also in favor of the above mentioned change.

Dr. Francisco Alarcón
Professor and Chair

Date: February 2, 2011

To: Dr. Terry Fries, Chair
Computer Science Department Curriculum Committee

From: Kustim Wibowo, Chair   *kw*
MIS and Decision Sciences Department

RE: COSC 108 Introduction to Programming via Alice

The MIS and Decision Sciences Department is pleased to support the new course proposal COSC 108 Introduction to Programming via Alice. This course proposal will have no effect on the MIS program.