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88-89

INDIANA UNIVERSITY OF PENNSYLVANIA
SENATE CURRICULUM COMMITTEE

NEW COURSE PROPOSAL

Department: COMPUTER SCIENCE

Person to Contact for Further Information: Mary Micco
x2637 x2524

Course Affected: CO 205
Programming Languages for Secondary Education

Desired Effective Semester for Change: Fall 1989

Approvals:

Department Committee Chairperson Katherine McKelvey

Department Chairperson

School Committee Chairperson

A. DESCRIPTION AND ACADEMIC NEED

A1. Catalog Description - see attachment.

A2. Syllabus - see attachment.

A3. This course is primarily intended to provide mathematics education majors with an introduction to the three computer languages most commonly used in secondary education (Pascal, LOGO, and BASIC) with a particular emphasis on PASCAL. Because of the programming languages being considered in this course, it may be of interest to students from other education majors. This course is not being proposed for inclusion in the Liberal Studies course list. This course may not be used to satisfy requirements for a computer science major.

A4. This course does not require any changes in the content of existing courses.

A5. This course follows the traditional approach of lecture courses in the Computer Science Department. Lectures are used to cover the course concepts while projects are used to provide practical experience.

A6. Currently this course is being offered as a Special Topics course.

A7. This is not a dual listed course.

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A8. No other higher education institution is known to currently offer this course.

A9. The proposed course is not currently recommended or required by any professional society, accrediting authority, law, or other external agency. It is anticipated that guidelines for minimal computer requirements for High Schools will be put in place shortly.

B. INTERDISCIPLINARY IMPLICATIONS

B1. This course is designed to be taught by one instructor.

B2. No additional or corollary courses are needed with this course.

B3. There should be no major duplication between the content of this course and the content of courses from any other department. Not only will the proposed course offer an introduction to Pascal, but it will then be compared to the other two languages, LOGO and BASIC. This course has been discussed with the faculty of the Mathematics Department who have requested its creation.

B4. This course may be applicable to the School of Continuing Education. The reaction of the School of Continuing Education to this course is that a few of their students may be interested in this course. Care must be exercised to insure that these students have sufficient computer experience for this course.

C. EVALUATION

C1. Student grades will be based on at least two in-class examinations, quizzes, a final examination, and at least six assignments. See the attachment for the description of representative programming projects.

C2. This course may not be taken for a variable number of credits.

D. IMPLEMENTATION

D1. The following resources will be needed for this course.

a. Faculty

No new faculty will be required to teach this course; however, this course will create an additional load on the present computer science faculty.

b. Space and Equipment

This course will require the use of personal computers, both IBM compatible (for BASIC and Pascal) and Apples (for BASIC and LOGO). In the short run, the equipment currently available in the Computer Science Department's laboratory and the Mathematics Department's Apple Laboratory can be used; however, in the long run, at least four additional IBM compatible computers and at least four additional Apple computers will be needed plus versions of Turbo Pascal on the IBMs, as well as LOGO for the Apples. Student work-study funds will need to be made available to ensure the lab is adequately staffed.

c. Laboratory Supplies

No laboratory supplies except printer paper and ribbons will be required.

d. Library Materials

Needed library materials are currently available.

e. Travel Funds

No travel funds will be needed for this course.

D2. This course will be offered as needed, probably every semester .

D3. If there is sufficient demand for this course, two sections will be offered.

D4. Each section of this course will be limited to twenty-five students. This limit is imposed by the complex nature of the programming tasks and the need for the instructor to interact with the students while they endeavor to explore three programming languages in one semester.

A1. Catalog Description

CO 205 Programming Languages for Secondary Education 3c-01-3sh

Prerequisite: [Enrollment is limited to education majors.] Previous experience with microcomputers is strongly recommended. Does not count toward a computer science major. Credit toward graduation will not be given if this course is taken after completing 6 or more credits of computer science courses.

Provides an introduction to the three high level programming languages most commonly used in secondary education; Pascal, LOGO, and BASIC, with particular emphasis on Pascal. Also includes a comparative study of the control structures and data structures present in these three languages. This course is intended to establish a solid foundation to prepare prospective teachers of computing courses K - 12.

A2. Syllabus

This course will be divided into three parts, one for each of the three programming languages being presented with approximately: LOGO 20%, PASCAL 60%, BASIC 20%. The order should be adjusted to take advantage of any previous programming experience the students may have. As each additional language is presented, its control structures and data structures will be compared to those of the previously presented language(s).

Following is an outline of the topics to be presented for each of the languages, with a suggested number of class periods.

LOGO (8 periods)

1. Turtle Graphics and input/output (1)
2. Writing Procedures without variables & REPEAT (1)
3. Writing Procedures with variables & Identifier Context (1)

symbol	"name
variable	:name
procedure	name
list	[name]

4. If..Then..Else (1)
5. Recursion (1)
6. Hierarchical Structure and passing variables in the context of algorithmic design. (2)
7. Beginnings of List Processing (1)

Pascal (24 periods)

1. Program Form (4)
   a. standard data types
   b. need for declarations - scalars and arrays
   c. statements -- assignment. decision. control and compound
   d. terminal Input/Output

2. User Defined Types; Naming of Types; enumeration and subrange (1)

3. Declarations and Common Data Structures (4)
   a. global identifiers
   b. arrays
   c. record and field references

4. Assignments and Expressions (2)
   a. Operators
   b. Built-in functions and procedures
   c. Type Mismatches

5. Decision and Loop Structures (4)
   a. IF
   b. CASE
   c. WHILE
   d. FOR
   e. REPEAT

6. Procedures and Functions (8)

   a. parameter declarations
   b. parameter classes - address and value
   c. local identifiers/scope
   d. nesting
   e. recursion

7. Hierarchical Structure, and Algorithmic design.
   Compare and contrast with LOGO (1).

BASIC (8 periods)

Will be compared and contrasted with PASCAL.

1. Program Form (2)
   a. standard data types
   b. need for declarations - scalars and arrays
   c. statements -- assignment. decision. control and compound
   d. terminal Input/Output

2. Graphics (1)

3. Input and Output (1)

   a. INPUT
   b. PRINT, TAB, GET

4. IF -- relational and logical operators (1)

5. Decision and Controlled Loop Structures (1)

6. Subprograms (1)
   a. GOSUB / RETURN
   b. DEF FN

7. Hierarchical Structure and Algorithmic design. Compare and contrast with Pascal and LOGO. (1)

C1. Suggested Assignments:

There should be at least six projects altogether. These could be a combination of programming projects and papers or presentation projects.

The programming projects would be used to develop skill in using the three programming languages being studied. These projects should also be used to expose the students to the different computing environments - the Apple computers and the IBM compatible computers.

The papers or presentation projects would be used to discuss the similarities and differences between the three programming languages being studied.

Suggested Texts:

Cooper, Doug, and Michael Clancy, Oh! PASCAL. 2nd edition, New York: W. W. Norton, 1985.

Billstein, Sibeskind and Lott. Apple Logo, New York: Benjamin Cummings, 1986.

Mandell, Steven L., Introduction to BASIC Programming. N.Y.: West Publishing Company, 1985.

Suggested Reference Texts:

Lukas, George and Joan Lukas; LOGO: Principles, Programming, and Projects; Monterey, California; Brooks/Cole Publishing Company; 1986.

Shelly, Gary B. and Thomas J. Cashman; Introduction to BASIC Programming; Brea, California; Anaheim Publishing Company; 1982.

Stivison, Douglas S.; Introduction to Turbo Pascal; Berkeley, California; SYBEX Inc.; 1985.