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FACULTY SENATE

CURRICULUM COMMITTEE

Course Approval Form

Department Mathematics

Title Computer Data Structures and Algorithms

Sponsor(s) Jack Cimprich No. of Credits 3

Approved by the department yes Graduate ()

Not recommended by the department Undergraduate (✓)

Information copies forwarded: Academic Dean; Chairman; Curriculum Committee

John Sany
 Signature: Department Chairman

ACADEMIC DEAN

Consultation on proposal has been held

Comments:

Alan Donovan 4/11/75
 Signature: Academic Dean

CURRICULUM COMMITTEE

Proposal received 4/11

Open Hearing held 5/2

Returned to the department for the following reason(s):

*1 out of 3 articles
 app. 5/2 done*

Approved by the Curriculum Committee

Presented to Executive Committee of the Faculty Senate as information

Notifications forwarded: Academic Dean; Department Chairmen

[Signature]
 Signature: Chairman, Curriculum Committee

*approved
 4/11/75
 J.S.*

GLASSBORO STATE COLLEGE

Glassboro, New Jersey

Department of Mathematics

Course Proposal

I. Identification of the Proposal

- A. Course Title: Computer Data Structures and Algorithms
- B. Sponsor: Jack Cimprich, Department of Mathematics
- C. Administrative Responsibility: Dr. John Sooy, Chairman,
Department of Mathematics

II. Outline of the Proposal

- A. Semester hours of credit granted: 3
- B. Course level: undergraduate course taken after freshman year.
- C. Prerequisites: Introduction to Computer Science
- D. Curricula Pattern: Required course in currently proposed computer science concentration.
- E. Enrollment: 15 per section offered once a year.
- F. Staff and Resource Requirement: No new staff or equipment are needed for this course. Library holdings are quite adequate. Improvements in computer science facilities (e.g. creation of a computing room in the Robinson Building) have, in fact, increased motivation for this course and are very adequate. And, because of the unlimited usage leasing plan adopted by Glassboro for our computer terminals, this course can be offered with no extra computer cost to the college.
- G. Uniqueness of the Course: Although this type of course is including in almost all computer science programs at other colleges, Glassboro, at present, has no course like it.
- H. Specific Objectives of the Course
 - 1. This course is a "second - course" in computer science and so can expect the student to work on computer programs of more realistic complexity than in the first course.
 - 2. Since an important part of computer usage involves the handling of large amounts of data, the student will study many types of data structures possible including linked lists, graphs, stacks, queues, trees, and strings.

3. The course will also cover important programming techniques (algorithms) in such areas as storage allocation, searching, sorting, and string-processing using the different types of data structures learned.

I. Suggested texts for use in this course are :

1. Hattison, M. : Data Structures and Programming; Scott, Foresman and Company; 1973
2. Brillinger, P. and Cohen, D. : Introduction to Data Structures and Non-Numeric Computations; Prentice-Hall; 1972

III. Rationale

- A. Most colleges having the equivalent of a minor in computer science include a course of this type program.
- B. This course provides the student interested in computer science with a major amount of "hands on" programming along with a heavy emphasis on techniques and knowledge expected of the computer professional entering the job market today.
- C. Material of a very similar nature was offered during the intersession 1973-4 course called "Advanced Programming Lab" and was received with great success by approximately 13 - 15 students.

IV. Catalog Description

Computer Data Structures and Algorithms (Prerequisites: 0701:102)

A continuation of Introduction to Computer Science requiring FORTRAN programs of more realistic complexity. Topics include data structures (strings, lists, graphs, stacks, trees) and methods (algorithms) of manipulating data (storage allocation, searching, sorting, and up-dating).

V. Course Outline

- A. Introduction - course objectives and requirements
- B. Review of FORTRAN and continuation of advanced topics: multi-dimensional arrays, character manipulation, sub-routines, and logical data.
- C. Sorting methods - primitive sort, bubble sort, merge sort. Evaluation and comparison of the speed of algorithms.
- D. Character strings - source scanning, linear and binary searches of tables, text-editing.

- E. Linked Lists - implementation in arrays, procedures for adding, deleting, and finding list elements. Variable-length-field handling using lists.
- F. Generalized link structures - multi-linked lists, trees, graphs.
- G. Methods of traversing trees, applications of trees and graphs, stacks, queues, and recursion.
- H. Three exams, three major programs, and several minor programs will be required of the student.

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- E. **Linked Lists** - implementation in **arrays**, procedures for **adding**, **deleting**, and **finding list elements**. **Variable-length-field** handling using lists.

- F. **Generalized link structures** - **multi-linked lists**, **trees**, **graphs**.

- G. **Methods of traversing trees**, **applications of trees and graphs**, **stacks**, **queues**, and **recursion**.

- H. **Three exams**, **three major programs**, and **several minor programs** will be required of the student.