

Faculty Senate Curriculum Committee

APPROVAL FORM

OFFICE OF THE DEAN  
ARTS AND SCIENCES  
5/82  
SEP 2 1982

(e)

Proposal Title: Discrete Mathematics for Computer Scientists

Sponsor(s): Beth Bergmann, Robert Mitchell

Dept.: Mathematics & Computer Science

Check one:  Course  Specialization  Concentration  Achievement Certificate

Minor Change  Major Program  
(please name: deletion or credit/title/catalog change)

Certification Program

Undergraduate  Graduate 3 Credit Hours

Step 1 (Department)

Approved 5/14/83  
date

Not Approved

Beth Bergmann  
Dept. CC Chairperson

Reviewed 3/28/83  
date

J. J. Mast  
Chairperson, Dept.

Step 2 (Receipt)

SCC# 82-83-28

Proposal Received 3/29/83  
date

Shirley A. O'Day  
Chairperson, SCC

Step 3 (Division CC)

Reviewed May 16 '83  
date

Approved

Not Approved

Comments:

Mel Meyer  
Chairperson, Div. Curr. Comm.

Step 4 (Academic Dean)

Comments:

Reviewed 9/12/83  
date

Alan Norcia  
Signature, Dean of Division

Step 5 (SCC)

Open Hearing Date: 9/20/83  Approved by Senate Curriculum Committee 10/3/83 (date)

Returned to sponsor(s) for the following reasons:

Objectives - change in C.A.T. Description Done

Step 6 (Faculty Senate)

Presented to Faculty Senate (date): 10/14/83

Approved  
 Not Approved

Notification to Vice-President Academic Affairs (date): 10/17/83

Shirley A. O'Day  
Signature: SCC Chairperson





OFFICE OF THE VICE-PRESIDENT  
FOR ACADEMIC AFFAIRS

OCT 21 1983

Faculty Senate  
445-5244

State of New Jersey  
GLASSBORO STATE COLLEGE  
GLASSBORO, NEW JERSEY 08028

GLASSBORO STATE COLLEGE

19 October, 1983

71 8774-150

M E M O R A N D U M

TO: Dr. Herman James, Vice President for Academic Affairs  
FROM: Shirley A. O'Day, Chairperson -- Senate Curriculum  
Committee

The following course has been approved by the Senate Curriculum Committee, reported to the Faculty Senate, and is recommended to you for implementation.

82-83-28 Discrete Mathematics for Computer Scientists  
3 Credits -- Undergraduate

DR JAMES

I SEE NO PROBLEM WITH THIS COURSE  
IF APPEARS TO BE STRICTLY A MAJOR COURSE IN THE  
COMPUTER SCI. PROGRAM. RECOMMEND APPROVAL

Hickley 11/7/83

SAO/eo



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The following course has been approved by the Senate Curriculum Committee, reported to the Faculty Senate, and is recommended to you for implementation.

82-83-28 Discrete Mathematics for Computer Scientists  
3 Credits -- Undergraduate

DR JAMES

I SEE NO PROBLEM WITH TAT'S COURSE  
IF APPEARS TO BE SIMILAR TO MAJOR COURSE IN THE  
COMPUTER SCI. PROGRAM. RECOMMEND APPROVAL

*Hickley* 11/7/83

SAO/eo

## COURSE PROPOSAL

### DISCRETE MATHEMATICS FOR COMPUTER SCIENTISTS

#### 1. Details

- a. Course Title: Discrete Mathematics for Computer Scientists
- b. Sponsors: Seth Bergmann, Robert Mitchell, Department of Mathematics and Computer Science
- c. Course level: Undergraduate, primarily Freshman or Sophomore (Will be a prerequisite for Computer Architecture and Assembly Language Programming (0704.204), Computer Data Structures and Algorithms (0704.322), and Digital Computer Design (0704.301))
- d. Curricular Effect: Computer Science Major Requirement. This change to the Computer Science Major requirements will help bring the Computer Science Major into conformity with other B.S. Degrees at the college. The total number of credits required for graduation will remain at 120 semester hours (The free elective requirement will be reduced by 3 semester hours.)
- e. Prerequisites: Introduction to Computer Science (0701.102) and Intermediate Algebra (1701.121)
- f. If possible, one section of this course will be scheduled for the Fall of 1983, and additional sections will be added as needed.
- g. There are currently 14 full-time people in the department who are well-prepared to teach this course. Computer resources required are minimal. Supplementary texts are available in the library.

#### 2. Rationale

This course is needed to ensure that Computer Science Majors are adequately prepared to take some of the required courses at the sophomore through senior levels. Part of this course content is presently scattered in several advanced computer science courses, and the rest is not taught at all. We need to consolidate this material into one course so that courses such as Computer Architecture and Assembly Language

Programming (0704.204), Computer Data Structures and Algorithms (0704.322), and Principles of Digital Computer Design (0704.301) do not need to spend time on mathematical preliminaries.

### 3. Essence

a. The objectives of this course, in terms of student outcomes are as follows:

- I. As a result of completing this course, a student will be able to do arithmetic in the binary, octal, and hexadecimal number systems. A student will also gain familiarity with computer data representation formats and elementary computer arithmetic.
- II. The student will also solve problems in mathematical logic (tautologies and contradictions, algebra of propositions, conditional and biconditional statements, arguments, etc.). The student will learn how logic is implemented in gates and how to simplify logic circuits.
- III. The student will understand the concepts of flow charts and algorithms and will be prepared for more advanced work in analysis of algorithms.
- IV. The student will understand the concepts of Boolean Algebras, sets, and relations which will be helpful in future study of Digital Computer Design and Relational Data Base Management Systems.
- V. The student will be able to solve problems in combinatorics and permutations, and will understand the concepts of trees and proof by induction (time permitting), all of which are essential for the analysis of algorithms.
- VI. The student will also gain an understanding of some elementary data structures such as graphs and trees, and will receive an exposure to elementary automata theory.

b. Topical Outline:

- I. Number systems and computer codes
  - A. Binary arithmetic and conversions with ones complement and twos complement representations
  - B. Hexadecimal arithmetic and conversions
  - C. Octal arithmetic and conversions
  - D. BCD codes
  - E. Packed decimal format and arithmetic
  - F. Floating point format and arithmetic
- II. Logic
  - A. Mathematical logic
  - B. Boolean Algebra

- C. Logic gates
- D. Simplification of logic circuits

### III. Software structures

- A. Algorithms
- B. Flow charts
- C. Pseudo code

### IV. Algebra

- A. Sets
- B. Relations
- C. Subscripted variables
- D. Matrix arithmetic

### V. Combinatorics

- A. Combinations
- B. Permutations
- C. Trees
- D. Mathematical Induction (time permitting)

### VI. Graphs and Automata

- A. Directed and undirected graphs
- B. Tree graphs
- C. Finite state machines (transducers and acceptors)

c. Students will be graded on the basis of homework problems, examinations, and, at the instructor's discretion, computer programs which are relevant to the course content.

## 4. Consultations

a. The following professors were consulted for opinions on this proposal:

Professor Guerard, Industrial Education and Technology

Professor Lynch, Administrative Studies

Professor Goldberg, Physical Sciences

Professor Shaw, Philosophy and Religion

Professor Ralston, Computer Science, SUNY Buffalo

## 5. Additional information

a. A suggested text book for this course is Essential Computer Mathematics by Seymour Lipschutz (McGraw-Hill)

b. Additional material can be found in Mathematical Structures for Computer Science by Judith L. Gersting (W.H. Freeman Company)

c. Catalogs of the following colleges and universities were examined. They all had a course in "Discrete Mathematics" or

"Discrete Structures" similar to the one being proposed here.

Bloomsburg State College  
SUNY Buffalo  
University of Pennsylvania  
Pennsylvania State University  
University of Delaware  
Temple University

## 6. Catalog Description

1703.201 \*

Discrete Mathematics for Computer Scientists  
(Prerequisites: 0701.102 and 1701.121)

This course includes topics in discrete mathematics essential for work in Computer Science beyond elementary programming. Students will solve problems in Number Systems and Computer Codes, Logic, Software Structures, Algebra, Combinatorics, Graphs, and Automata. Emphasis will be placed on the solutions of problems in these areas and, at the instructor's discretion, computer programs which are relevant to these areas.

\* Recommended HEGIS number



State of New Jersey  
GLASSBORO STATE COLLEGE  
GLASSBORO, NEW JERSEY 08028

Industrial Education and Technology

M E M O R A N D U M

- - - - -

TO: Professor Seth Bergman  
FROM: Mike Guerard *MG*  
DATE: March 4, 1983  
SUBJECT: Course Proposal

Thank you for allowing me to review your proposal for DISCRETE MATHEMATICS FOR COMPUTER SCIENTISTS. I find the course to be an appropriate addition to your curriculum, especially in view of the rationale you presented. We have encountered similar problems in our own department, where students did not have elementary prerequisite skills which had to be taught at the beginning of a course.

I would suggest that if this course is to serve its intended function, it will be necessary to specify it as a prerequisite to the advanced courses you mention, and to ENFORCE that requirement. Otherwise, it will be necessary to teach it in those courses anyway, or at least require the students to acquire that knowledge in some remedial fashion. This, of course, is contrary to the stated rationale.

The topics listed appear to be appropriate; I assume that the topic of sequential logic will be deferred until the Digital Design course?

One last comment -- the course description seems a little brief; might it not be appropriate to include something about what the students will DO, such as perform arithmetic and logical operations; design, analyze and implement elementary logical structures, etc?

Please call if I can be of any further assistance.



**State of New Jersey**

**GLASSBORO STATE COLLEGE**

**GLASSBORO, NEW JERSEY 08028**

**ADMINISTRATIVE STUDIES  
DEPARTMENT  
(609) 445-6025**

March 7, 1983

TO: Seth Bergmann  
Mathematics & Computer Science Department  
Robinson

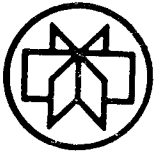
FROM: Robert D. Lynch *RDL*  
Administrative Studies Division

SUBJECT: New Course Proposal: Discrete Mathematics for  
Computer Scientists

I have reviewed your course proposal entitled "Discrete Mathematics for Computer Scientists" which is designed for Computer Science majors. The student in Computer Science is exposed to a wide variety of requirements in mathematical skills. These requirements result from the nature of the hardware design itself as well as from the complexities of many programming languages.

This course should provide a solid basis for the more advanced courses required in your program and should be a welcome addition to your curriculum.

RDL/Thw



DEPARTMENT OF COMPUTER SCIENCE

FACULTY OF NATURAL SCIENCES AND MATHEMATICS

March 11, 1983

Dr. Seth Bergmann, Assistant Professor  
Dept. of Mathematics and  
Computer Science  
Robinson Building  
Glassboro State College  
Glassboro, NJ 08028

Dear Prof. Bergmann:

I'm always pleased to find another college taking the discrete math challenge seriously.

Even though it is not quite how I would handle it, your syllabus seems quite appropriate. Three comments:

1. I'm no longer as I once was enamored of your topic I. It is one of those rare pieces of mathematics that might be done better in a computer science course.

2. You don't mention algorithms but I hope they will play an important role in your course.

3. Neither do you mention induction but it certainly should play a major role in the course.

As to books, I'm not very happy with using a Schaum outline as a text. The Gersting book may be much better. I haven't looked at it yet although I'm about to review it. My own book is a long way from being completed but I still intend to get it done.

Sincerely,

  
Anthony Ralston

AR:mk

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