

6

2

Glassboro State College Senate Curriculum Committee

Approval Form

Proposal Title: Advanced Topics in Discrete Mathematics

Sponsor(s) Wai-Kei Yau Dept.: Math/Computer Science Ext. 6044

Check one: Course Specialization Concentration Minor Achievement Certificate
 Certification Program Major Program Minor Change (please name deletion or credit/title/catalog change)

Undergraduate Graduate 3 Credit Hours

<p>Step 1 (Department)</p> <p><input checked="" type="checkbox"/> Approved <u>5/19/87</u> Date</p> <p><input type="checkbox"/> Not Approved</p> <p><u>[Signature]</u> Dept. CC Chairperson</p> <p><input checked="" type="checkbox"/> Reviewed <u>10-2-87</u> Date</p> <p><u>[Signature]</u> Dept. Chairperson</p>	<p>Step 2 (Receipt)</p> <p><input type="checkbox"/> SCC# <u>8788 10</u></p> <p>Proposal Received <u>5/15/87</u> Date</p> <p><u>[Signature]</u> SCC Chairperson</p>	<p>Step 3 (School CC)</p> <p>Reviewed <u>11/10/87</u></p> <p><input checked="" type="checkbox"/> Approved <input type="checkbox"/> Not Approved</p> <p>Comments:</p> <p><u>[Signature]</u> School Curr. Comm. Chairperson</p>
---	---	---

Step 4 (Academic Dean) **Comments:**

Recommend
 Not Recommend
 Conditionally Recommend (see comments)

Reviewed 11-23-87
Date

[Signature]
Signature, Dean of School

Step 5 (SCC)

Open Hearing _____ Date

Approved by Senate Curriculum Committee 12/18/87
Date

Returned to sponsor(s) for the following reasons: X-13

Step 6 (Senate)

Presented to Senate 1/29/88
Date

Approved Not Approved

Notification to Vice-President for Academic Affairs 2/1/88
Date

[Signature]
Signature, SCC Chairperson

STEP 7 (Vice-President for Academic Affairs)

Received 2/6/88
Date

Approved YES No

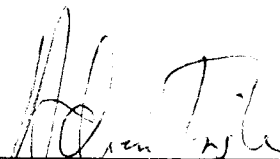
If no, reasons are as follows:

Student credit hours _____

Faculty load hours _____

Equalized credit hours _____

Official copy and approval sheet filed 5-21-88
Date



Signature, Vice-President for Academic Affairs

Registrar

Approved course description received _____
Date

Hegis Taxonomy and Course Number assigned _____

Signature, Registrar Date

Notification forwarded:

- Senate Curriculum Committee Chairperson
- Department Chairperson(s)
- Academic Dean(s)
- Registrar
- Sponsor(s)

COURSE PROPOSAL

ADVANCED TOPICS IN DISCRETE MATHEMATICS

I. Details:

- a. Course Title: Advanced Topics in Discrete Mathematics
- b. Sponsors: Philip Demp, Wai-Kei Yau, Department of Mathematics and Computer Science
- c. Course Level: Junior
- d. Curriculum Effect: This course will be a restricted elective for Computer Science Major and for Math Major
- e. Pre-requisites: Discrete Mathematics, Calculus I
- f. One section of this course to be offered for Fall 1988 with at least one section to be offered each successive school year.
- g. Facilities and resources will be adequate.

3/4
3-4/85

II. Rationale:

The development of computers and computer science over the past three decades has opened up a vast new area for the applications of mathematics. As a result, an increasing number of mathematical areas have become important to the field of computer science with additional areas on the way. Such subjects as combinatorics, graph theory, algebraic structures, and lattice theory have made Discrete Mathematics the fastest growing research area in mathematics. Also, students in the social and management sciences and even physical sciences and the social and management sciences and even physical sciences and engineers will increasingly need to formulate and solve their problems in discrete terms so that they can be solved on computer.

III. Essence:

A. The objectives of this course are as follows:

1. To continue the non-trivial coverage of mathematical topics not covered in Discrete Mathematics.
2. To motivate the students by showing the relevance of the selected mathematical topics to the computer science curriculum.
3. To prepare students for more advanced courses such as Compiler Design, Theory of Computation, Advanced Programming and Artificial Intelligence.
4. To familiarize students with a variety of mathematical topics not available in the present curriculum.

b. Topic Selection Will Include At Least Two Of The Following:

1. Analysis of Algorithms
 - a. Time Complexity
 - b. A shortest-path algorithm
 - c. Complexity of Problems
 - d. Tractable and Intractable Problems
2. First Order Mathematical Logic
 - a. Rules of Inference
 - b. Axiomatic Theories
 - c. Predicates and Quantifiers
 - d. Predicate Logic and First Order Theories
 - e. Substitution of a term for a variable
 - f. Removing and inserting quantifiers
3. Advanced Combinatorics
 - a. Inclusion - Exclusion principle
 - b. Pigeonhole principle
 - c. Combinatorial Identities
 - d. Divide and Conquer Relations
 - e. Discrete Probability
4. Digraphs and Networks
 - a. Digraphs and Relations
 - b. Orientable Graphs and Topological Sorting
 - c. Activity Analysis and Longest Paths
 - d. Transport Networks
 - e. Maximal Matchings
5. Recursion Theory - Difference Equations
 - a. Linear recurrence relations with constant coefficients
 - b. Homogeneous solutions
 - c. Particular solutions
 - d. Total solutions
 - e. Solution by method of generating functions
 - f. Sorting algorithms
6. Lattice Theory
 - a. Partially Ordered Sets
 - b. Extremal elements of POSETS
 - c. Lattices
 - d. Boolean Algebras
 - e. Boolean Functions

7. Formal Languages and Automata
 - a. Sequential Circuits and Finite State Machines
 - b. Finite-State Automata
 - c. Types of Languages and Grammars
 - d. Phase-Structure Grammars
 - e. Non-deterministic Finite-State Automata
 - f. Relationships between Languages and Automata

8. Coding Theory
 - a. Coding of binary information and error detection
 - b. Decoding and error correction

IV. Consultations:

Marcus Wright, Mathematics and Computer Science
Tom Osler, Mathematics and Computer Science
Seth Bergmann, Mathematics and Computer Science

V. Additional Information:

Most likely any one of the following textbooks would be used during the course's initial offering:

Polimeni and Straight; foundations of Discrete Mathematics, Brooks/Cole Publishing Co., 1985.

Kolman and Busby: Discrete Mathematical Structures for Computer Science, Prentice-Hall Inc., 1984.

Liu; Elements of Discrete Mathematics, McGraw-Hill Book Co., 1985.

Grimaldi: Discrete and Combinatorial Mathematics, Addison-Wesley, 1985

Moluzzo and Buckley: A First Course in Discrete Mathematics, Wadsworth Publishing Co., 1985.

Kalmanson: An Introduction To Discrete Mathematics, Addison-Wesley Publishing Co., 1986.

VI. Catalog Description:

1703.300

Advanced Topics in Discrete Mathematics

(Prerequisites: 1701.130 and 1703.150)

Topics covered include a selection from the following: Analysis of Algorithms, First order Mathematical Logic, Combinatorics, Digraphs and Networks, Recursion Theory and Difference Equation, Lattice Theory, Formal Languages and Automata, and Coding Theory.

MEMO

Glassboro State College

Department of Mathematics and Computer Science

TO: Whom It May Concern

FROM: Tom Osler, Math/Computer Science

RE: Comments On The Course Proposal DATE: April 30, 1987

ADVANCED TOPICS IN DISCRETE MATHEMATICS

This course proposal has my full support. The topics covered should help the students with such courses as "Compiler Design", "Artificial Intelligence" and "Theory of Computing".

MEMO

Glasboro State College

Department of Mathematics and Computer Science

TO: Professors Demp and Yau

FROM: Seth Bergmann

RE: Comments On The Course Proposal DATE April 30, 1987

This memo is to express my support of the proposal for Advanced Topics in Discrete Mathematics. As a restricted elective for the Mathematics and Computer Science majors this course will effectively serve two purposes.

It is clear that the discrete component of mathematics has not been adequately addressed in our curriculum, and this course will go far to rectify that problem. Extensive knowledge of advanced topics in discrete mathematics is essential for Computer Science (and Mathematics) students who plan to attend graduate school.

MEMO

Glassboro State College

Department of Mathematics and Computer Science

TO: Professors Demp and Yau

FROM: Marcus Wright

RE: Advanced Topics in Discrete Mathematics DATE April 30, 1987

Advanced Topics in Discrete Mathematics will provide an opportunity for students to learn more about the increasingly important topics of applied modern algebra and mathematical logic. It will prove beneficial, especially to students who go on to study compiler theory, and theory of computation, and artificial intelligence. The course will give Glassboro State College a distinctive curricular strength in computer-related mathematics without having to offer individual semester-length courses on each of the included topics. I strongly urge its inclusion into the catalog. For students going on to graduate school, this course will be excellent preparation, both for the Graduate Record Exam and graduate courses.