

# Approval Form

Proposal Title: Design and Analysis of Algorithms

Sponsor(s) Nancy Tinkham Dept.: Computer Science Ext. 7323

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

Undergraduate  Graduate      Credit Hours

<p><b>Step 1 (Department)</b></p> <p><input checked="" type="checkbox"/> Approved <u>1/27/93</u> <small>Date</small></p> <p><input type="checkbox"/> Not Approved</p> <p><u>A. Michael Berman</u> <small>Dept. CC Chairperson</small></p> <p><input checked="" type="checkbox"/> Reviewed <u>1/27/93</u> <small>Date</small></p> <p><u>Don C. Stone</u> <small>Dept. Chairperson</small></p>	<p><b>Step 2 (Receipt)</b></p> <p><input type="checkbox"/> SCC# <u>92-1000</u></p> <p>Proposal Received <u>    </u> <small>Date</small></p> <p><u>Mary D. Lubman</u> <small>SCC Chairperson</small></p>	<p><b>Step 3 (School CC)</b></p> <p>Reviewed <u>4-28-93</u></p> <p><input checked="" type="checkbox"/> Approved <input type="checkbox"/> Not Approved</p> <p><b>Comments:</b> <u>Course should be 300 level</u></p> <p><u>J. Caldwell</u> <small>School Curr Comm. Chairperson</small></p>
--	---	--

<p><b>Step 4 (Academic Dean)</b></p> <p><input type="checkbox"/> Recommend <input type="checkbox"/> Not Recommend <input type="checkbox"/> Conditionally Recommend (see comments)</p> <p>Reviewed <u>    </u> <small>Date</small></p>	<p><b>Comments:</b></p> <p><u>    </u></p> <p><u>    </u> <small>Signature, Dean of School</small></p>
---	--

<p><b>Step 5 (SCC)</b></p> <p>Open Hearing <u>10/24/93</u> <small>Date</small></p> <p><input type="checkbox"/> Returned to sponsor(s) for the following reasons:</p>	<p><input checked="" type="checkbox"/> Approved by Senate Curriculum Committee <u>10/18/94</u> <small>Date</small></p>
--	--

<p><b>Step 6 (Senate)</b></p> <p>Presented to Senate <u>10/26/94</u> <small>Date</small></p> <p>Notification to Executive Vice-President/Provost <u>10/26/94</u> <small>Date</small></p>	<p><input checked="" type="checkbox"/> Approved <input type="checkbox"/> Not Approved</p> <p><u>Ronald J. Gocho</u> <small>Signature, SCC Chairperson</small></p>
--	---

**Step 7 (Executive V.P./Provost)**

Received 11/4/94  
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 \_\_\_\_\_  
Date

*Donald C. Coyle*  
Signature, Executive Vice-President/Provost

**Registrar**

Approved course description received 11/20/94  
Date

Hegis Taxonomy and Course Number assigned 0104-220

*P. J. Murphy*  
Signature, Registrar

11/20/94  
Date

**Notification forwarded:**

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

92-93-166

**Rowan College of New Jersey  
Department of Computer Science**

**Course Proposal**

**Design and Analysis of Algorithms**

CS 207-243

1. Details

- a. Course Title: Design and Analysis of Algorithms
- b. Sponsor: Nancy Tinkham, Computer Science Department
- c. Credit Hours: 3
- d. Course Level: Junior
- e. Curricular Effect: Required course for computer science majors
- f. Prerequisites: Data Structures (0704.222), Pre-calculus (1701.122), Discrete Mathematics (1703.150), Foundations of Computer Science
- g. Suggested Time, Implementation: One or two sections per year, beginning as soon as possible.
- h. Resources: Faculty, equipment, and library resources are adequate

2. Rationale

The ability to design solutions to programming problems and analyze the efficiency of these solutions is an essential part of a computer science education, whether the student is being prepared for a programming job or for graduate school. None of our current courses are able to give as much time and attention to the design of algorithms and a survey of existing algorithms as is needed in a computer science curriculum.

The addition of an algorithms course will help to make our students better programmers. The course will also strengthen the theoretical component of the computer science program, as recommended by the curriculum of the ACM/IEEE-CS Joint Curriculum Task Force and by the 1991-92 department self-study review.

3. Essence of the course

a. Objectives in relation to student outcome

Students will learn some of the tools and commonly-used approaches for the design of efficient algorithms, and they will become familiar with the algorithms used to solve many standard problems. They will learn how to analyze an algorithm's efficiency, using "Big-O" and other measures, and how to improve the execution time and space usage of algorithms. Students will also learn to recognize and prove that certain problems are NP-Complete.

b. Topic outline

Paradigms and tools for algorithm design (such as recursion, "divide and conquer", and dynamic programming)

Sorting

Searching and hashing

Algorithms for graphs, sets, matrices, and other structures

Analysis of algorithms and "Big-O" notation

NP-Completeness

c. Evaluation of students

Students will be graded on the basis of homework (including programming projects) and exams.

d. Course evaluation

The course will be evaluated as part of our department self-study every 5 years.

4. Results of consultation

A Self Study of the Computer Science Department was conducted in the Spring of 1992, with Dr. John Beidler of the University of Scranton as a consultant. In his report, Dr. Beidler recommended the addition of an Algorithms course to strengthen the theoretical component of the curriculum.

**Catalogue description:**

Design and Analysis of Algorithms

*(Prerequisites: 0704.222, 1701.122, 1703.150, and Foundations of Computer Science.)*

In this course, students will learn to design and analyze efficient algorithms for sorting, searching, graphs, sets, matrices, and other applications. Students will also learn to recognize and prove NP-Completeness.

Suggested hegis #: 0704.350

## 4 Responses to Recommendations

### Recommendation 1: Design and Analysis of Algorithms Course

This would be an appropriate core course that would serve to cover the theory component in the core.

### Recommendation 2: Two Cs Course from the restricted electives.

More thought has to go into the advanced part of the curriculum in order to guarantee that students obtain in depth knowledge in three of the six CSAB areas. The department should drop the non-computer science courses from the advanced restricted electives and strengthen the curriculum in general.

### Recommendation 3: Replace Compiler Design by a Formal Language and Automata Theory Course.

The issues surrounding the selection of required advanced courses versus advanced optional courses is more complicated than this. In general, the curriculum does need more theory courses to balance the curriculum, but whether to make it required must be given more thought.

### Recommendation 4: Inserting one credit to courses.

There is a definite trend towards the development of closed laboratories for a variety of computer science courses. In this case, I question the appropriateness of a laboratory course to teach the programming language "C". I do not quite understand why the learning of "C" is such a big issue with juniors and seniors! Given the variety of programming languages and software development experience they should have by the time they take this course, they should find it easy to pick up most of "C" and only a few lectures should be required to cover the major highlights of the language.

### Recommendation 5: Three Credit Laboratory Techniques Course.

I have mixed feelings about this course. It seems to me that since you expect a student to know how to program before they take CS 1, by the time they complete CS 1 and CS 2, they should know how to use one system, probably the VAX/VMS. We have had good experience moving students to UNIX and X by preparing a set of handouts that give them the fundamentals. Once they are up and running with this new environment, they find the UNIX ManPages in X more than adequate to answer most of their questions.