UNIVERSITY REGISTRAR
VIRGINIA TECH

ENTERED 3.21.21 ~BS

Prerequisite/Corequisite Change Request
(Existing Courses)

General Information			
Date:	3/18/21	***Effective Term:**	Fall 2021
College/Department:	Engineering/Computer Science		
Course Designator and Number *(Cross-listed Course Designator and Number):*	CS 5114		
Title of Course:	Theory of Algorithms		
Instructor and/or Department Contact:	Trey Mayo/Director of Graduate Programs		
Contact Phone:		**Contact E-mail:**	treymayo@vt.edu

Prerequisite Enforced	
Enable prerequisite enforcement?	☐ Yes ☒ No

Add the following Prerequisite/Corequisites:

Graduate standing in the CSA program

*Attach department **letter of support** to include a non-departmental course as a prerequisite/corequisite.*

Drop the Following Prerequisites/Corequisites:

CS 2604

List Course Prerequisites/Corequisites **after change:**

Graduate standing in the CSA program

Justification *(Justify prerequisite/corequisite changes and remaining prerequisites/corequisites after change)*

CS 2604 is no longer offered by the department and the student must have the necessary foundational coursework to be admitted to the CSA graduate program.

If adding a minimum grade as a prerequisite for a course, data must be provided to clearly show the need for that minimum grade in order to be successful in the course. Minimum grade requirements may not be used as a way to limit enrollment.

*If request is being processed for the upcoming **effective term:**

- Requests to **ADD** prerequisite requirements (i.e., turn enforcement **ON**, add grade restriction, add course) must be processed prior to the opening of "course request" for the applicable effective term.
- Requests to **REMOVE** prerequisite requirements (i.e., turn enforcement **OFF**, remove a grade restriction, drop course) may be completed at any time, unless the removal causes the course to be more restrictive.

Approval Signatures			
Department Head/Chair		*Date*	3/18/2021
College Curriculum Committee Representative	Alexander Lowsse	*Date*	3/19/21
College Dean		*Date*	3/19/21

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COMPUTER SCIENCE 5114
THEORY OF ALGORITHMS
(ADP TITLE: THEORY OF ALGORITHMS)

I. CATALOG DESCRIPTION:

5114 THEORY OF ALGORITHMS

Methods for constructing and analyzing algorithms. Measures of computational complexity, determination of efficient algorithms for a variety of problems such as searching, sorting and pattern matching. Geometric algorithms, mathematical algorithms, and theory of NP-completeness.

Pre: 2604. (3H,3C) II.

II. LEARNING OBJECTIVES:

Having successfully completed this course, the student will be able to construct efficient algorithms in a variety of areas in numeric and non-numeric computing. Students will also be able to define relevant measures of algorithm efficiency, apply these measures to algorithms, and be able to assess the relative computational complexity of the measured algorithms.

III. JUSTIFICATION:

Much of the constructive activity in computer science involves the creation of algorithms. To be proficient in this activity it is important that students gain insight into the methods for designing and analyzing alternative algorithms as well as develop a background in the classical algorithms found in mathematics, geometry, text processing, and searching and sorting.

The catalog description has been slightly changed to reflect more accurately the content of the course, and the syllabus updated to reflect a slight change in course content. CS 2604 is added as a prerequisite to provide adequate background in data structures. This assures a common foundation for all students in the course, including students without undergraduate computer science degrees.

IV. PREREQUISITES AND COREQUISITES:

The perquisite 2604 provides background on data structures necessary for the design and analysis of algorithms.

V. TEXTS AND SPECIAL TEACHING AIDS:

Cormen, Thomas H., Charles E. Leiserson, and Ronald L. Rivest, INTRODUCTION TO ALGORITHMS. MIT Press/McGraw-Hill Book Company, 1989, 1028p..

Manber, Udi. INTRODUCTION TO ALGORITHMS. Reading, Massachusetts: Addison-Wesley Publishing Company, 1989. xiv, 478.

VI. SYLLABUS:

	Percent of Course
1. Characteristics of algorithms: complexity measures	5%
2. Models of computation	5%
3. Problem solving	10%
4. Techniques for efficient algorithm design	10%
5. Sorting and searching problems	15%
6. Geometric algorithms	10%
7. Mathematical algorithms: polynomial evaluation, matrix multiplication and related problems	15%
8. String processing and pattern matching	10%
9. Fast Fourier Transform and applications	5%
10. Reductions and NP - complete problems	15%
	100%

VII. OLD (CURRENT) SYLLABUS:

1. Characteristics of algorithms: complexity measures	5%
2. Models of computation	5%
3. Concepts of program design and analysis; data abstraction	15%
4. Techniques for efficient algorithm design	10%
5. Sorting and searching problems	15%
6. Geometric algorithms	10%
7. Mathematical algorithms: Polynomial evaluation, matrix multiplication and related problems	15%
8. String Processing and Pattern Matching	10%
9. Fast Fourier Transform and applications	5%
10. NP - Complete problems	10%
	100%

VIII. CORE CURRICULUM GUIDELINES:

NA