UNIVERSITY REGISTRAR
VIRGINIA TECH

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 5604 | | |
| **Title of Course:** | Information Storage and Retrieval | | |
| **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:

None

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

Graduate standing in the CSA program

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

Student must be admitted to the graduate program in CSA in order to take the course.

*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* | | *Date* | 3/19/21 |
| *College Dean* | | *Date* | 3/19/21 |



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# COMPUTER SCIENCE 5604
# INFORMATION STORAGE AND RETRIEVAL
# (ADP TITLE: INFO STORAGE AND RET)

## I. CATALOG DESCRIPTION:

5604 INFORMATION STORAGE AND RETRIEVAL

Analyzing, indexing, representing, storing, searching, retrieving, processing and presenting information and documents using fully automatic systems. The information may be in the form of text, hypertext, multimedia, or hypermedia. The systems are based on various models, e.g., Boolean logic, fuzzy logic, probability theory, etc., and they are implemented using inverted files, relational thesauri, special hardware, and other approaches. Evaluation of the systems' efficiency and effectiveness.

Pre: Graduate standing; (3H,3C). I.

## II. LEARNING OBJECTIVES:

Having successfully completed this course, the student will be able to operate conventional as well as experimental retrieval, hypertext, and multimedia systems. The student will also be able to employ the basic data structures and algorithms that are used in information storage and retrieval and to explain how methods borrowed from related areas (e.g., database management, probability, artificial intelligence) apply.

## III. JUSTIFICATION:

This course is essential for a well-rounded understanding of the use of computers for managing information. Course material will aid the understanding of information technology, digital libraries, networked information discovery, bibliographic and full-text retrieval systems, hypertext, hypermedia, multimedia and library automation. It will prepare graduate students for work in such applied areas as well as for research in fundamental topics of information science.

The syllabus has had major revisions which reflect the tremendous changes that have occurred in the field of information storage and retrieval since this course was last revised at the beginning of the semester system.

## IV. PREREQUISITES AND COREQUISITES:

Graduate standing is required in order to insure that students have the educational maturity and the discipline-specific background necessary for this course.

## V. TEXTS AND SPECIAL TEACHING AIDS:

**Required text:**

Frakes, William B. and Ricardo Baeza-Yates. INFORMATION RETRIEVAL: DATA STRUCTURES AND ALGORITHMS. Englewood Cliffs, New Jersey: Prentice-Hall, 1992. viii, 504.

**Supplemental text:**

Salton, Gerard. AUTOMATIC TEXT PROCESSING. Reading, Massachusetts: Addison-Wesley Publishing Company, 1989. xiii, 530.

## VI. SYLLABUS:

Percent of Course

1. Introduction to Digital Libraries 6%
   a. Electronic/digital libraries, electronic products/services
   b. Intellectual property rights, legal and social issues

2. Introduction to Information Storage & Retrieval 6%
   a. Review of data structures and algorithms, evaluation
   b. Importance, functional/topical views, timeline of progress

3. Inverted Files / Boolean Systems 14%
   a. Library and online searching methods and services
   b. Boolean model, file structures, operations, extended Boolean retrieval

4. String Searching 14%
   a. PAT trees and arrays, PAT algorithms and operations
   b. Algorithms and animations of conventional string searching

5. Ranking / Relevance Feedback 10%
   a. Vector space and probabilistic models and feedback
   b. Data structures, weighting, operations, optimizations

6. Indexing / Document Analysis 6%
   a. Manual vs. automatic, lexical analysis and word lookup
   b. Stopword removal, stemming/morphological analysis

7. SGML / Document Translation 10%
   a. Markup, Standard Generalized Markup Language
   b. Electronic publishing, translation between representations

8. Multimedia Information Systems 10%
   a. Compression, standards, digital audio/images/video
   b. Authoring, systems, storage, architectures

9. Hypertext / Hypermedia 10%
   a. Systems, operations, databases, features
   b. Navigation, data model, link services

10. Knowledge-Based Information Retrieval 14%
    a. Representation, expert systems, AI, computational linguistics
    b. Distributed expert-based information models and systems

100%

## VII. OLD (CURRENT) SYLLABUS:

1. Introduction 10%
    a. Information systems. Functional approach
    b. Data and file structures

2. Boolean logic and inverted file systems 10%
    a. Boolean logic model, set processing
    b. Design and use of systems like DIALOG, BRS, VTLS

3. Automatic indexing and analysis 12%
    a. Manual indexing. Empirical laws of text collections
    b. Term extraction and weighting. Term association and thesauri

4. Experimental systems 13%
    a. SIRE and SMART. Vector and probabilistic models
    b. Relevance feedback

5. Evaluation 10%
    a. Efficiency considerations. Effectiveness measures
    b. Use of SMART for retrieval evaluation

6. Enhancements 10%
    a. Term weighting. Document clustering. Query improvement. Citation processing

7. Special hardware 10%
    a. Microcomputers, associative processors, intelligent disks. Text scanning and string searching hardware and algorithms. Storage devices: magnetic, optical

8. Natural language and artificial intelligence approaches 15%
    a. Computational lexicography, text analysis, question answering. Role of AI programming, knowledge representation, and expert systems. CODER project

9. Research and Future Directions 10%
    a. Applications to libraries, networks, offices, individuals. Advanced methods: ex., extended Boolean logics, term dependencies. Open problems.

100%

## VIII. CORE CURRICULUM GUIDELINES:

NA