CSC 320
Algorithms and Models of Computation
Spring 2005

Syllabus and General Information

Class Meetings

Lectures: Monday/Wednesday/Friday, 9:00 AM – 9:50 AM, Room SCI 233

Instructor

Prof. Nadeem Abdul Hamid *Phone:* (706) 368-5632 (office)
Office: SCI 354B *Email:* nadeem@acm.org
Office Hours: Mon 11-12:30, 2-3:30 • Tues 9-12:30 • Wed 11-12:30, 2-3:00 • Thurs 2-3:00 • *(or by appt)*

Course Catalog Description

CSC 320 Algorithms and Models of Computation **3-0-3**

Models of computation and computational complexity. General algorithmic strategies and advanced data structures. Algorithms for specialized problem domains, including artificial intelligence and numerical methods. Parallel algorithms and distributed computing. *Prerequisites: A grade of C or better in both CSC 220 and CSC/MAT 219.*

Course Objectives

Upon completion, students should be able to explain the basic methods and conclusions of the theory of computation. They should be able to apply these methods to problems from different fields and be guided by the results in searching for computational solutions to the problems.

In particular, students should be able to:

- Explain the theoretical limits on computational solutions of undecidable and inherently complex problems.
- Describe concrete examples of computationally undecidable or inherently infeasible problems.
- Devise and analyze the complexity of procedures to determine properties of computationally bounded automata.
- Understand formal definitions of machine models.
- Prove the undecidability or complexity of a variety of problems.
- Understand advanced algorithmic designs, such as probabilistic and parallel algorithms.

Expected Outcomes

The student will meet the objectives with at least 70% success, based on performance on assignments and exams.

Methods of Instruction

Three lectures per week.

Materials & Resources

Required Textbook:

- Michael Sipser, *Introduction to the Theory of Computation*, PWS Publishing Company, 1997. ISBN# 0-534-94728-X.

Online course website:

- *https://vikingweb.berry.edu* - It is your responsibility to check the Viking Web site for this course regularly (*i.e.* daily) throughout the semester, as it will be regularly updated with announcements, lecture notes, assignments, *etc.*

Assignments and Grading

Student grades will be determined on a standard 10% grade scale: 90% - 100% earns an A, 80% - 89% earns a B, *etc.*, with the instructor reserving the right to apply +/- grades at his discretion. Grades will be based on the weighted average of the following course work:

Participation (10%) – Attendance and participation in class will be taken into consideration as well as in-class exercises and/or occasional (possibly unannounced) quizzes. (See *Attendance Policy* below.)

Assignments (45%) – There will be a regular series of assignments throughout the course, given approximately every week. **Late assignments will not be accepted unless an excuse is obtained prior to the day on which the assignment is due.**

Exams (45%) – There will be 3 exams, **tentatively** scheduled as follows. Each exam will be worth 15% of the course grade.

- First Exam, Wednesday, February 9, 2005
- Second Exam, Friday, March 11, 2005
- Final Exam, Tuesday, April 26, 2005 (8:00AM – 10:00AM)

Tentative Syllabus (see the course webpage for up-to-date topics, reading material, assignments, and lecture notes)

(Week of)	
Jan 7 – 10	Introduction and Mathematical Preliminaries
Jan 17 (no class Monday, January 17)	LaTeX programming
Jan 24	Finite automata
Jan 31	Regular expressions
Feb 7	Context-free grammars
Feb 14	Turing Machines
Feb 21	Decidability and the Halting Problem
Feb 28 – Mar 7	Reducibility and advanced topics in computability theory
Mar 21	Complexity theory (time complexity)
Mar 28	NP-completeness; NP-complete problems
Apr 4 – Apr 18	Advanced topics in algorithmics

Course Policies

- *Attendance Policy:* Please see the Berry College Viking Code for "Class Attendance Policies" (pp 10-11, 2004-2005 edition). Missing three (3) or more classes without justifiable reason (and appropriate documentation) will be considered excessive absences.

  Attendance records will be kept by the instructor. Sign-in sheets will be circulated every class period and attendance records will be kept from the sign-in sheet. **If your name is not readable on the list, you will be marked absent**. Signing for someone else will be considered a serious breach of academic integrity.

- *Academic Integrity:* Students are expected to have read carefully and understood the rules governing breaches of academic integrity that are to be found in the Viking Code (pp 16-17) and the Course Catalog (pp 27-28, 2003-2005 edition). Be aware that, unless otherwise specified, all assignments, labs, and examinations in this course are expected to be done on an individual basis. When it comes to learning and understanding the *general material* covered in class or *practice problems*, you may certainly use other references and/or have discussion with other students or people outside this class. However, when it comes to work that is submitted for evaluation in this course, all such work must be entirely your own. The only exception to this is that **you are very welcome to consult the instructor for assistance**.

- *Late Work:* Late work will not be accepted unless an excuse is obtained prior to the day on which the assignment is due. This policy will be waived only in an "emergency situation" with appropriate documentation and/or prior arrangement with the instructor.

- *Disabilities:* Students with disabilities who believe that they may need accommodations in this course are encouraged to contact the Academic Support Center in Krannert Room 326 (Ext. 4080) as soon as possible to ensure that such accommodations are implemented in a timely fashion. Failure to contact the Academic Support Center will constitute acknowledgement that no disability exists and that no accommodations are needed.