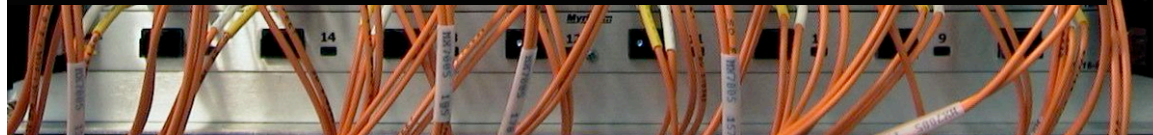


# CS 134: Digital Computation and Communications



Instructor:	Tom Murtagh	Stephen Freund
Office:	TCL 309	TPL 302
Phone:	597-2369	597-4260
Email:	<a href="mailto:tom@cs.williams.edu">tom@cs.williams.edu</a>	<a href="mailto:freund@cs.williams.edu">freund@cs.williams.edu</a>
Office Hours	T, Th 1:00 - 2:30	M, W 2:30 - 4:00

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## Course Description

A digital revolution has transformed the way we communicate and process information. Digital cameras have replaced film, CDs have replaced LPs, DVDs have replaced analog VCR tapes, and communications through email, chat systems, and the Web have become part of daily life. This course explores the principles that underly such digital information processing and communication systems.

The representation of information in discrete, symbolic form is ultimately what makes a system digital. We will examine digital techniques for representing information. How can a beam of light traveling through an optical fiber represent a sequence of 0s and 1s? How can numeric data capture the tones we hear when we listen to a digital recording? As we explore these questions we will examine the tradeoffs involved in the design of schemes for representing information.

All digital information processing and communication systems are driven by precise rules or algorithms expressed as computer programs. We will develop an appreciation for the nature and limitations of such algorithms by exploring abstract algorithms for complex processes and by learning the basics of computer programming in Java. Programming topics covered will include objects, classes, methods, conditional and iterative control structures, text/string processing, arrays, and recursive lists. Programming projects will include network applications like IM chat clients, tools to process and compress digital images, and simple network servers. While the programming assignments for the course will focus on the application of programming to communication, the programming skills students develop will be applicable in many other areas. In particular, this course is designed to provide the programming skills required to complete CSCI 136 and/or CSCI 237.

## Text

Students should purchase a copy of the course packet from the Computer Science Department. Additional readings will be distributed in class or through the course web site.

## Labs

Room 217A in Thompson Chemistry (TCL) is the primary lab for CSCI 134. You can do all of the programming exercises on these computers. In addition, the software we will use for this course is freely available on the web if you wish to install it on your own computer.

Lab sessions will be held each week. These sessions provide a time during which your instructor can actively assist you in the development of programs. Lab descriptions will be handed out in advance, and you will be expected to have planned your approach to the assignment before the beginning of lab.

You will submit your laboratory programs electronically. Laboratory programs will be accepted up until 11:00 P.M. on the second night after your lab session. Laboratory programs will not be accepted after

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the due date, but in computing your grade the lowest score on **submitted** assignments will be dropped. Therefore, it is to your advantage to submit assignments on time, even if they are incomplete.

## Final Programming Project

In addition to the weekly programming laboratories, students will be expected to complete a final programming project during the final weeks of the semester.

## Exams and Final Grades

There will be one written exams given at midterm (on the evening of 10/29) and another during the final exam period. The times and places for these exams will be announced on the web site. Grades will be determined as follows:

Laboratory programs:	20%	Midterm	20%	Final Project	20%
Homework Assignments:	20%	Final exam:	20%		

## Computer Science Honor Code

The Honor Code as it applies to non-programming assignments is outlined in the Student Handbook. For programming assignments in Computer Science courses, the honor code is interpreted in very specific ways. When a program is assigned, your instructor will identify it as a “practice,” “test,” “laboratory,” or “team” program. The Honor Code applies differently to each with respect to collaboration or assistance from anyone other than the TAs or instructors:

**Test Programs.** Any assignment designated as a test program is to be treated exactly as a take-home, open-book test. You are allowed to read your textbook, class notes, and any other source approved by your instructor. You may not consult anyone other than your instructor. The instructor encourages the asking of questions, but reserves the right not to answer, just as you would expect during an exam. Guideline: Any work that is not your own is considered a violation of the honor code.

**Laboratory Programs.** Laboratory programs are expected to be the work of the individual student, designed and coded by him or her alone. Help locating errors is allowed, but a student may only receive help in correcting errors of syntax; help in correcting errors of logic is strictly forbidden. Guideline: Assistance from anyone other than the TAs or instructors in the design or coding of program logic will be considered a violation of the honor code.

**Team Programs.** Team programs are laboratory or test programs to be worked on in teams of two or more students. You are allowed to discuss team programs with your partners, but work with others is otherwise restricted by the appropriate rules above. Guideline: Any work that is not the work of your team is considered a violation of the honor code.

If you do not understand how the honor code applies to a particular assignment, consult your instructor. The Department of Computer Science takes the Honor Code seriously. Violations are easy to identify and will be dealt with promptly.

Suggestion: To protect your work dispose of printouts carefully, and avoid leaving your programs on hard disks in labs and other public storage areas.

## Computer Ethics

Students should be aware of the Computer Ethics outlined in the Student Handbook. Violations including uninvited access to private information and malicious tampering or theft of computer equipment or software are subject to disciplinary action.

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## Lecture Topics and Readings

The table below shows the topics we plan to cover in each lecture. Students should consult the course web page for updates to this schedule and for the readings that should be completed for each topic.

	Date	Topic
1.	9/11	Being Digital
2.	9/14	Encoding in Binary
3.	9/16	Providing a GUI Interface
4.	9/18	Network Communication in Java
5.	9/21	Huffman Codes for Text
6.	9/23	Conditional Execution
7.	9/25	Transmitting Binary Signals
8.	9/28	Processing Strings in Java
9.	9/30	Iteration
10.	10/2	Transmission Delays and Framing
11.	10/5	Ethernet Operation
12.	10/7	Java Class Definitions
13.	10/9	Java Class Definitions
14.	10/14	Ethernet Performance
15.	10/19	Ethernet Performance
16.	10/21	Recursive Class Definitions
17.	10/23	Recursive Class Definitions
18.	10/26	Switched Networks
19.	10/28	Internetworking
20.	10/30	Class cancelled ( due to midterm exam held on 10/29 )
21.	11/02	IP Addressing, Forwarding & Configuration
22.	11/04	Indexing & Image Manipulation
23.	11/06	Arrays & Image Manipulation
24.	11/09	Arrays + Image Compression
25.	11/11	Image Compression
26.	11/13	Inheritance
27.	11/16	Web Protocols
28.	11/18	Server Programming
29.	11/20	Routing Algorithms
30.	11/23	Transport Protocols + TCP
31.	11/30	TCP Connections + Retransmission
32.	12/02	Error Detecting Codes
33.	12/04	Error Detecting Codes
34.	12/07	Reductions and Intractability
35.	12/09	Topics in CS
36.	12/11	Topics in CS