CIS 570—Introduction to Formal Language Theory—Fall 2008

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Course Website	people.cis.ksu.edu/~stough/570/
Lectures	MWF 9:30–10:20 a.m. N127
Help Sessions	U 6:00–7:00 p.m. N127
Office Hours	MWF 10:30–11:20 a.m. N214

1 K-State Online, Communication by E-mail and Course Website

I will only use K-State Online for posting grades and collecting e-mail addresses. I will often communicate with the class by e-mail, and so it is important that you read your mail frequently. I will make various resources (including this document) available on the course website.

2 Office Hours and Help Sessions

If you need to talk with me outside of my scheduled office hours (MWF from 10:30-11:20 a.m. in N214), you can either make an appointment in advance or try dropping by my office to see if I'm in and available.

Help sessions will be held on Thursday evenings from 6:00–7:00 p.m. in N127, beginning in the first week of the semester. At these sessions, I'll answer questions, solve problems, go over model answers to exercises or exam questions, give hints about exercise sets, hold exam review sessions, etc. These sessions will be more informal and interactive than the class lectures.

3 Canceled Classes

There will be no classes, help sessions or office hours from September 18–25, inclusive, when I will be away at a conference. But, to make up for a lost help session, there will be a special help session from 6:00–7:00 p.m. on Monday, September 29.

4 Prerequisites

The course's prerequisites, by both course and topic, are listed below.

- CIS 505 (Introduction to Programming Languages): functional programming; trees and other datatypes; recursion. CIS 505's prerequisites are listed below.

    - CIS 300 (Algorithms and Data Structures): algorithms; trees and other data structures; recursion.
    - CIS 301 (Logical Foundations of Programming): mathematical induction; reading and writing formal mathematical proofs.

- MATH 510 (Discrete Mathematics): basic set theory; mathematical induction; reading and writing informal mathematical proofs.

If you haven't received a C or better in both CIS 505 and MATH 510, you must discuss your situation with your academic adviser by the end of the first week of the semester.

5 Objectives

The course has two main objectives:

- To familiarize students with the basic concepts and techniques of formal language theory.

- To further develop students' competence at reading and writing mathematical proofs.

We'll study several ways of describing formal languages, using regular expressions, different kinds of finite automata, grammars and programs. And we'll see that there are limits to what can be computed. Formal language theory has important applications in many areas of computer science, including compiler construction (CIS 706) and software engineering (CIS 771 and CIS 842).

Computer scientists who can write mathematical proofs need not be satisfied with informal arguments that their work is correct.

6 Draft Textbook and Lecture Slides

We'll be using the Fall 2008 draft of my textbook on formal language theory, entitled *Formal Language Theory: Integrating Experimentation and Proof*, along with corresponding lecture slides. I'll be revising the book and lecture slides as the semester progresses, and both the book and slides will be posted—section by section—on the course website.

You may find it useful to also study the related sections of another book on formal language (automata) theory. Note, however, that the notation and definitions used by any particular book won't be identical to the ones we'll be using.

7 The Forlan Toolset

Many of the algorithms that we will study are implemented as part of the Forlan toolset—a collection of tools for experimenting with formal languages that I've been developing since 2001. Forlan is implemented as a set of Standard ML (a functional programming language) modules. It's used interactively. In fact, a Forlan session is nothing more than a Standard ML session in which the Forlan modules are available.

As the course progresses, you'll learn how to use Forlan, and you'll be using it when solving some of the homework exercises. Forlan is available on the CIS computing system, and can be installed on personal computers. More information about Forlan is available on the course website.

8 Exercise Sets and Examinations

The following table lists the course's six exercise sets and two examinations. It gives the due date and time of each exercise set, the date and time of each exam, and the percentage of the course grade that will come from the grade of each exercise set or exam.

Exercise Set 1	Tuesday, September 30	4:00 p.m.	10%
Exercise Set 2	Tuesday, October 14	4:00 p.m.	10%
Exercise Set 3	Tuesday, October 28	4:00 p.m.	10%
Mid-term Exam	Wednesday, November 5	9:30–10:20 a.m.	15%
Exercise Set 4	Tuesday, November 11	4:00 p.m.	10%
Exercise Set 5	Tuesday, November 25	4:00 p.m.	10%
Exercise Set 6	Tuesday, December 9	4:00 p.m.	10%
Final Exam	Thursday, December 18	11:50 a.m.–1:40 p.m.	25%

Exercise sets may be handed in: in class, at my office or at the "Front Office" (N234).

Late exercise sets will be assessed a penalty of 25% during the first twenty-four hours. Work that is more than twenty-four hours late will not be graded. If you don't succeed in finishing an assignment by the time it is due, you can submit a partial solution on time and submit the rest later (but not later than twenty-four hours after the due-date); only the late parts will be assessed the penalty.

If you are asked to provide a transcript of a Forlan session as part of an exercise, then the transcript that you submit must faithfully record your interaction with Forlan.

When preparing solutions to exercise sets, you may make use of material in published books and articles, although you must clearly indicate what material you have taken from where. On the other hand, you may *not* make use of unpublished material, including my own, unless I make this work available on the course website.

When preparing solutions to exercise sets, you'll find it very useful to make use of a document processing system, such as LaTeX, that handles mathematics well. For example, you'll sometimes have to write proofs with a number of similar, but subtly different, cases. If you are preparing such a proof using a document preparation system, then you won't have to rewrite each case from scratch. Information about LaTeX is available on the course website.

The mid-term and final examinations will be closed-book and closed-notes. You will not be allowed to use computers during the exams. If you miss an exam, without having an excuse approved by me, then you will receive no credit for that exam.

The grader and I will take the elegance and simplicity of your work into account when doing grading.

9   Collaborative Work

You may work on exercise sets either alone or with an approved partner (see below). Before an exercise set is due, you may *discuss* your work on the exercise set with other people, but you may not *show* your work on the exercise set to anyone other than your partner (if any) and me, and you may not *look* at the work on the exercise set of anyone other than your partner (if any).

I encourage you to work with a partner—I believe you will both learn more and earn better grades this way. Partnerships must be approved by me, and should consist of students with roughly equal ability. We'll spend part of the first help session trying to match people up, but students may also propose partnerships on their own.

If, at some point during the semester, either partner no longer believes that their partner has roughly equal ability with them, then they must notify me of this fact, at which point I will try to match both students up with more appropriate partners. At any point in the semester, if you are dissatisfied with your partner or your lack of a partner, you should discuss the situation with me.

Each pair of partners will hand in a single copy of each exercise set, labeled by both of the partners' names. Both partners are responsible for understanding every aspect of the work that they jointly hand in. It is permissible, though, for partners to hand in separate solutions to a part of an exercise set, when there isn't a single solution that they both understand.

Failure to follow the preceding rules will be considered cheating.

10 Attendance Policy; Material for which You are Responsible

Attendance at lectures and help sessions is *not* mandatory. Official announcements will always be made (at least) by e-mail, and archived on the course website. For the exercise sets and exams, you'll only be held responsible for the material in the textbook, lecture slides, and model answers to exercise sets and examinations.

On the other hand, failure to participate in lectures and help sessions may negatively impact your learning, and thus your performance on the exercise sets and exams.

11 Statement Regarding Academic Honesty

Kansas State University has an Honor System based on personal integrity, which is presumed to be sufficient assurance in academic matters one's work is performed honestly and without unauthorized assistance. Undergraduate and graduate students, by registration, acknowledge the jurisdiction of the Honor System. The policies and procedures of the Honor System apply to all full and part-time students enrolled in undergraduate and graduate courses on-campus, off-campus, and via distance learning. The honor system website can be reach via the following URL: www.ksu.edu/honor.

A component vital to the Honor System is the inclusion of the Honor Pledge which applies to all assignments, examinations, or other course work undertaken by students. The Honor Pledge is implied, whether or not it is stated: "On my honor, as a student, I have neither given nor received unauthorized aid on this academic work." A grade of XF can result from a breach of academic honesty. The F indicates failure in the course; the X indicates the reason is an Honor Pledge violation.

12 Academic Accommodations for Students with Disabilities

Any student with a disability that needs a classroom accommodation, access to technology or other assistance in this course should contact Disability Support Services and/or their instructor.

13 Expectations for Classroom Conduct

All student activities in the University, including this course, are governed by the Student Judicial Conduct Code as outlined in the Student Government Association By Laws, Article VI, Section 3, number 2. Students that engage in behavior that disrupts the learning environment may be asked to leave the class.

14 Grading

Each assessment unit will be graded using the following 100 point scale: A+ (100), A (92), A– (84), B+ (76), B (68), B– (60), C+ (52), C (44), C– (36), D+ (28), D (20), D– (12), F (0). (E.g., a grade of 80 points should be thought of as being halfway between a B+ and an A–.)

Your letter grade for the course will be computed as follows: if your overall numerical grade is at least 80, then you will receive an A; otherwise, if it is at least 56, then you will receive a B; otherwise, if it is at least 32, then you will receive a C; otherwise, if it is at least 10, then you will receive a D; otherwise, you will receive an F.

15 Comments and Suggestions

If you have any comments, complaints, suggestions or questions about the course, please communicate them to me, verbally, by e-mail or in writing. I reserve the right to award extra credit to students who make useful comments, suggestions or complaints, or who ask good questions, about the course.