CS 301: Languages and Automata	January 9, 2009

CS 301 Course Information

Prof. Robert H. Sloan — *Handout 1*

Lecture: Tuesday–Thursday, 2:00–3:15, LC A5
Weekly Problem Session: Wednesday, 4:00–4:50 p.m., LC A5
(Weekly Problem session will start meeting *second* week of classes.)

Professor's home page: `http://www.cs.uic.edu/~sloan`.
Professor's Office: 1112 SEO. Phone: 6-2369.
Email: Prof's last name at host `uic.edu`.
Professor's office hours: Tuesdays, 3:30–5:00, Thursdays 12:45–1:45, and by appointment.
TA: Fadi Al-Masalha (tentative but highly likely)
TA Office hours: to be announced. (probably on Blackboard site)

This course will have a UIC Blackboard page. We will definitely use it for its grade book, and probably that is where we will post assignments, etc. I'm not planning to use it for much else.

1 Course Topics

— Subject to change without notice —

- Introduction.
  - What is the subject matter of this course? Chapters 1, 3.
  - 30–60 minutes of review of Discrete Math. Appendix A up to A.6.7.
  - Alphabets, strings, languages. Chapter 2.
  - A bit about different notions of infinity: countable and uncountable. Appendix A.6.8.–A.6.9.
- Finite Automata. Part II of textbook.
  - Deterministic Finite Automata.
  - Nondeterministic Finite Automata.
  - Regular expressions.
  - Using Regular Expressions elsewhere in Computer Science (Appendix O).
  - Showing that a language is *not* regular.
- Context-Free Languages. Part III of textbook.
  - Context-Free Grammars.
  - Pushdown Automata.
  - Parsing (Portions of Chapter 15).
- Turing machines and computability theory. Part IV, Chapters 17–21
  - Turing machines.
  - Basic undecidability (halting problem).
  - More undecidability: Reductions.
  - Rice's Theorem (Chapter 21.4).
- The above should leave quite a bit of extra time. It will be filled by some combination of additional advanced material from Chapters 25, 27, and 28 (Recursive function theory and/or basic complexity theory, including P and NP) **OR** by considering a selection of applications of this material from Appendices G–Q, depending on class (and instructor!) interest.

2 Key Learning objectives

At the completion of the course, all students should have the ability to:

- Determine a language's location in the hierarchy: regular languages, context-free languages, and recursively enumerable languages.
- Prove that a language is in a specified class.
- Convert among DFAs, NFAs, and regular expressions.
- Explain the Church-Turing Thesis and its significance.
- For certain languages, prove that they are *not* recursively enumerable.

3 Textbook; JFLAP software

The required textbook for the course is *Automata, Computability and Complexity: Theory & Applications* by Eliaine Rich, 2008. year.

(It's a brand-new book, and I would appreciate student reviews later in the semester.)

3.1 JFLAP

We will use the simulation and visualization tool JFLAP available from URL `http://www.jflap.org/`. when we work with DFA's, and perhaps a bit later on as well. It is free.

It runs best as a Java application; the easiest thing for most people will be to download a copy and run it on your own machine (Linux, Mac, or PC).

To download JFLAP, go to the JFLAP website, fill in the form that asks for some information, and then when taken to the download page get the file JFLAP.jar that is listed near the top, currently Version 6.4 as of July 2008.

I will *not* help people with problems installing or running JFLAP on Windows; I don't especially expect problems, but, while I hack, cook, clean, and take care of my children, *I don't do Windows!*

Email me if you'd like a copy of JFLAP to be installed on the department Unix machines.

The optional book is a guide to JFLAP; it is fairly cheap but you can certainly manage without it.

4 Prerequisite

CS 202 is a corequisite (i.e., you must either have already taken it, or be taking it this semester).

5 Grading

This policy is subject to change at any time for any reason.

There will be one or two midterms.

The final exam will be comprehensive.

I may give an occasional announced quiz; if so, they will take only twenty minutes or so and count the same as one problem set.

Problems sets: 15%.
Hour exams: 30–40%.
Final: 45–55

You must pass the final in order to pass the course.

If you do not work on almost all the problem sets, then do not expect to pass the course.

Homework will generally be given each week and will generally be due at the Wednesday discussion section. Late homework will *not* be accepted, because homework will generally be due at the problems session, and solutions will normally be given then and there.

Late homework will receive a grade of 0. (Of course, a missing homework may be *excused* altogether if, for example, you are seriously ill.)

6 Rules and regulations

Incompletes

The *UIC Undergraduate catalog* states that in addition to needing excellent justification for an incomplete, a student must *also* have been "making satisfactory progress in the course."

Therefore, no matter how good your excuse, I will not grant you an incomplete if you have less than a C average at the time you ask for an incomplete.

Academic Integrity

You may discuss the homework problems with other students—in fact, I encourage you to do so—but you are expected to write up your solutions by yourself. *If you do work on the problem sets with other students, please put the names of your group at the top of your problem set. If you consult any web page while working on an assignment, put the URL for the page on the homework.*

If your homework is highly similar to another students' homework or to a web page and you have not put that name or URL on your paper, then we will consider you to be guilty of cheating.

The minimum penalty for any cheating will be an F for the course (not just the exam or homework in question!), and the maximum penalty is expulsion from the University.

Keeping documents private

You must keep private and not email, post on the web, or share in any way:

- Any solutions to homework problem sets of tests that we give you,
- Any lecture notes posted to Blackboard (unless they say that they are 100% by Prof. Sloan).

There are two different reasons for this: First because some of these materials are provided by the textbook's author who insists on this arrangement. Second, because some problems from the book will be assigned to other students elsewhere, and they loose their value if solutions are distributed.

7 First two reading assignments

7.1 First reading assignment

Review reading: Text Appendix A1.–A.6.7. (You should know this discrete math material from CS 201; I will devote a few minutes to a very fast very brief review.)

Reading of new material: Text, Chapter 1, Why Study this?, Chapter 2, Strings and Languages, Appendix A.6.8–A.6.9 about the infinite.

7.2 Second reading assignment

Text, Chapter 3, Overview of whole subject, Chapter 5.1–5.3, DFAs.