

CSE303 Introduction to the Theory of Computation
Spring 2018
Professor Anita Wasilewska
<http://3www.cs.stonybrook.edu/~cse303/>

Time: MONDAY, WEDNESDAY 2:30 pm - 3:50pm

Place : Engineering 143

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Office location: New Computer Science Department, office 208

Office Hours Monday, 4:10 pm - 5:00 pm, Wednesday 7:10 pm - 8: 30 pm, and by appointment

TA tba

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TA Office Hours

TA Office Location Room 2203 in Old CS Building

Textbook *Elements of the Theory of Computation* by Harry R. Lewis and Christos H. Papadimitriou, Prentice Hall, Second Edition

Course webpage <http://3www.cs.stonybrook.edu/~cse303/>

The webpage contains a set of **very detailed** Lecture Notes.

Lecture Notes closely follow the book.

Lecture Notes contain many examples and carefully written **solutions** to many of the homework problems.

Course Objectives

Introduce abstract models of computation such as finite and push-down automata, and analyze their relative expressive power.

Explore the connection between abstract machine models and formal languages, as specified by grammars.

Enhance students awareness of both the power and inherent limitations of algorithmic computation via the study of Turing machines and/or other abstract computational models.

Course Description

The course is an introduction to the abstract notions encountered in machine computation. Topics include finite automata, regular expressions, and formal languages, with emphasis on regular and context-free grammars. Questions relating to what can and cannot be done by machines are covered by considering various models of computation, including Turing machines, recursive functions, and universal machines.

Prerequisites : CSE 214 and 215

Grading General Principles and Workload

Workload: there will be four homework assignments, four quizzes covering respective **lecture material** and homework problems, practice midterm, midterm, practice final, and final examinations.

There will be some extra credit problems as a part of quizzes and tests.

The consistency of your efforts and work is the most important for this course.

None of the grades will be curved.

Records of students grades are being kept by the course TA. Contact the TA for information.

Homework assignments: there will be four (4) homework assignments. Look below for the homework assignment and schedule. **None of them will be collected or graded.** Students are responsible for solving the problems.

Solutions to almost all **homework problems** are included in **posted solutions** of past Quizzes and tests and in the LECTURE NOTES.

Students will be **tested** on their work on homework assignments by respective **quizzes**.

Students are strongly encouraged to discuss the intellectual aspect of the problems, but are responsible for formulating solutions in their own words.

Quizzes (total 100pts)

There will **4 quizzes**, 20 -25 minutes each, 25 points each.

Quizzes problems will be taken from, or very close to **homework assignments** and will also cover some definitions and examples included in **Lecture Notes** and posted solutions to previous Quizzes

Posted solutions of previous Quizzes and Tests contain solutions of majority of your Homework problems.

The format of Quizzes is similar to the REAL Quizzes posted (with solutions) on the course Webpage.

Quizzes (20 -25 minutes) will be given at the end of class on Wednesdays.

Here is a **preliminary schedule**. Changes, if any will be posted on the course Webpage.

Q1 - February 12 Q2 - March 5 Q3 - April 9, Q4 - April 30

Quizzes and Tests are **closed book** examinations.

Practice Midterm (10 extra pts) is a TAKE HOME test

It will be put on course webpage on **MARCH 7** and due **Monday , March 19** in class. It is designed to help students to study for Midterm test. I will POST the solutions on Monday, March 19 after class.

Midterm (100pts)

Midterm will cover material from Q1, Q2, Homework 1, Homework 2 (only problems dealing with material actually covered in class), and Practice Midterm.

Midterm TEST will be given on **Wednesday , March 21** in class.

Practice Final (10 extra pts) covers material from Q3 and Q4. It is a TAKE HOME test.

It will be put on course webpage on **April 30** and due **Wednesday May 2** in class.

Final (100pts) Final test will cover some material from the Q1, Q2, practice midterm and midterm, but mainly (70%) material covered by Q3, Q4, Homework 3 and Homework 4 (only problems dealing with material actually covered in class), and practice Final.

Final will be given will be given during the FINALS week May 8-16.

Previous TESTS and Quizzes

A collection of past Quizzes and Tests is posted the course Webpage.

They are designed to help you to learn what you have learned and what you still don't understand from the material covered by the test. You can take them for your own practice (don't need to submit it)

Practice tests policy

Practice tests are designed to help you to learn what and how much you have lea the real test.

Final grade computation You can earn up to 300 points + x extra points = 300+x points during the semester. **None of the grades will be curved.** The grade will be determined in the following way:

of earned points divided by 3 = % grade.

The % grade is translated into a letter grade in a standard way i.e.

100 – 95 % is *A*, 94 – 90 is *A–*,

89 – 86 % is *B+*, 85 – 83 % is *B*, 82 – 80 % is *B–*,

79 – 76 % is *C+*, 75 – 73 % is *C*, 72 – 70 % is *C–*,

69 – 60 % is D range and F is below 60%.

None of the grades will be curved.

Records of students grades are being kept by the course TA. Contact the TA for information.

Preliminary Quizzes and Tests Schedule

Changes, if any will be posted on the course webpage

QUIZ 1 MOnday, February 12

Covers Homework 1 (only problems dealing with material actually covered in class BEFORE the test day)

QUIZ 2 Monday, March 5

Covers Homework 2 (only problems dealing with material actually covered in class BEFORE the test day)

Practice Midterm a TAKE HOME test

It will be put on course webpage **March 7** and is due **Monday, March 19**, in class

SPRING BREAK March 12 - 18

MIDTERM Wednesday, March 21

QUIZ 3 Wednesday, April 9

Covers Homework 3 (only problems dealing with material actually covered in class before the test day)

QUIZ 4 Monday, April 25

Covers Homework 4 (only problems dealing with material actually covered in class before the test day)

Practice Final covers material from Q3 and Q4. It is a TAKE HOME test.

It will be put on course webpage on **April 25** and due **Wednesday, May 2** in class.

Last day of classes May 4

FINAL TEST The final will be given during the University assigned place and time during the FINALS period **May 8 - 16**, the exact date and place to be posted.

Course Content and Schedule

The course will follow the book very closely and in particular we will cover some or all material from the following chapters and subjects.

Chapter 1 Sets, Relations, Languages. (pp. 1 - 53)

Some of it a review material, languages part is new. You can use any other book for the review. Our book is very condensed.

I posted special Lectures Notes (Lecture1 and 2)

Chapter 2 (Part 1) Deterministic and Non-Deterministic Finite Automata and their equivalence. (pp.55- 75)

Chapter 2 (Part 2) Finite automata and regular languages. (pp 75 - 102)

Chapter 3 (Part 1) Context-free grammars and Pushdown automata. (pp. 113 - 140)

Chapter 3 (Part 2) Languages that are and are not context-free. (pp. 141-150)

Chapter 4 Turing Machines (pp 179 -194)

Chapter 5, 6 Church- Turing Thesis, Computability. Computational Complexity - general Overview

HOMEWORK ASSIGNMENTS

Homework 1 = Quiz 1 Covers book pages 1-52.

Problems: Pages 8-9: 1.1.1, 1.1.2, 1.1.4 Page 13: 1.2.1, 1.2.2, Page 18: 1.3.5, 1.3.6- 1.3.8, 1.3.11
Page 23: 1.4.1, 1.4.3 Page 29: 1.5.4, 1.5.8, 1.5.11 Page 40: 1.6.1, 1.6.2, 1.6.4, Page 46: 1.7.2,
1.7.4, 1.7.5, 1.7. 6 Page 51: 1.8.2, 1.8.3, 1.8.5, 1.8.6.

Homework 2 = Quiz 2 Covers book pages 55 - 83.

Problems: Pages 60-63: 2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.1. 7. Pages 73-75: 2.2.1, 2.2.2, 2.2.3, 2.2.6
2.2.9, 2.2. 10. Pages 83-85: 2.3.3, 2.3.4, 2.3.6, 2.3.7 a, 2.3.11 (extra credit).

Homework 3 = Quiz 3 Covers book pages 86 - 120.

Problems Pages 90-91: 2.4.5, 2.4.8. Pages 120-122: 2.5.1, 2.5.2, 2.5.3, 3.1.3, 3.1.7, 3.1.9, 3.1.10a,
c d.

Homework 4 = Quiz 4 Covers book pages 122- 194.

Problems: Page 129: 3.2.1, 3.2.2, Page 135: 3.3.1, 3.3.2, Page 148: 3.5.1, 3.5.2 a,b (extra credits).
Pages 191-193: 4.1.1 4.1.3, 4.1.4, 4.1.6, 4.1.7, Page 200: 4.2.2.

Academic Integrity Statement Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Any suspected instance of academic dishonesty will be reported to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at <http://www.stonybrook.edu/uaa/academicjudiciary/>

Stony Brook University Syllabus Statement If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact Disability Support Services at (631) 632-6748 or <http://http://studentaffairs.stonybrook.edu/dss> They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the following website:

<http://www.sunysb.edu/ehs/fire/disabilities.shtml>