CSE303 Introduction to the Theory of Computation
Spring 2016
Professor Anita Wasilewska
http://www.cs.stonybrook.edu/~cse303/

Time: Tuesday, Thursday 4:00-5:20pm
Place: JAVITS 103
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Office location: Computer Science Department building, office 208
Office Hours Tuesday, Thursday 2:30-3:30 pm and by appointment
TA to be announced
e-mail Look at the course webpage
TA Office Hours TBA


Course webpage http://www.cs.stonybrook.edu/~cse303/ contains a set of very detailed LECTURE NOTES.

Lecture Notes closely follow the book.
Lecture Notes contain hundreds of examples many of which are carefully written solutions to many of your 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
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 4 homework assignments, 4 quizzes covering respective lecture material and homework assignments, 1 midterm and a final examination.

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 be 4 quizzes, 20-25 minutes each, 25 points each.

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

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

Each quiz will also contain some SHORT questions that test your knowledge of basic facts and definitions from material covered.

**The format** of Quizzes is similar to the SAMPLE, PRACTICE and REAL Quizzes posted (with solutions) on the course Webpage.

**Quizzes** (20-25 minutes) will be given at the end of class on TUESDAYS. Here is a preliminary schedule. Changes, if any will be posted on the course Webpage.

Q1 - February 16  Q2 - March 8,  Q3 - April 12,  Q4 - April 26

Quizzes and Tests are closed book examinations.
Midterm (100pts)
Midterm will cover material from Q1, Q2 and Homework 1 and Homework 2 (only problems dealing with material actually covered in class).

It will also contain some SHORT questions that test your knowledge of basic facts and definitions from material covered. Short questions are similar to those of Quizzes and Practice Midterm.

Midterm TEST will be given on **Tuesday, March 24** in class

**Practice Midterm** - TAKE HOME test (15extra points) - will be put on Course webpage on **MARCH 14** and due **Thursday, March 24**

Final (200pts) Final test will cover some material from the midterm, but mainly (70%) the material covered after the midterm, i.e. material covered by Q3, Q4 and Homework 3 and Homework 4 (only problems dealing with material actually covered in class).

It will also contain some SHORT questions that test your knowledge of basic facts and definitions from material covered. Short questions are similar to those of Quizzes and Midterm.

Final will be given during the **FINALS week**

**Practice Final** (extra 15pts) will be given **Thursday, May 5** in class

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 400 points + 30 extra points = 430 points during the semester. **None of the grades will be curved.** The grade will be determined in the following way:

\[
\text{# of earned points divided by } 4 = \% \text{ grade.}
\]

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%.

**Quizzes and Tests Schedule** ( the dates can be changed)

**QUIZ 1** Covers Homework 1 (only problems dealing with material actually covered in class BEFORE the test day) **February 16**

**QUIZ 2** Covers Homework 2 (only problems dealing with material actually covered in class BEFORE the test day) **March 10**
Practice Midterm  a TAKE HOME test - will be put on Course webpage MARCH 10 and is due Tuesday, March 22

SPRING BREAK  March 14 - 20

MIDTERM  Thursday, March 24

QUIZ 3  Covers Homework 3 (only problems dealing with material actually covered in class actually covered in class BEFORE the test day)  April 12

QUIZ 4  Covers Homework 4 (only problems dealing with material actually covered in class actually covered in class BEFORE the test day)  April 28

Practice Final  (extra 15pts) will be given in CLASS on Tuesday, May 5

Last day of classes  May 5

FINAL TEST  The final will be given during the University assigned place and time during the FINALS period May 10 - 18, 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 Ju-
diciary. 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 learn-
ing 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 ac-
commodations 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