CSE303 Introduction to the Theory of Computation  
Fall 2023  
Professor Anita Wasilewska  
Course webpage  

Course Prerequisites: CSE 214 and 215

Time: Tuesday, Thursday 5:30 pm - 6:50 pm

Place: Engineering 145

Professor Anita Wasilewska  
e-mail anita@cs.stonybrook.edu  
Office phone (631) 632 8458  
Office location New Computer Science Department, office 208

Professor Office Hours t.b.a.

Teaching Assistants Office Hours are posted and updated on Brightspace

TA Office location: Room 2126 Old CS Building

Course Textbook

Elements of the Theory of Computation  
Harry R. Lewis and Christos H. Papadimitriou  

Additional Textbook

Turing’s Vision - The Birth of Computer Science  
Chris Bernhard  

We also have a special YOUTUBE CHANEL created for the course:

Theory of Computation https://www.youtube.com/channel/UCLZp06JC9yit6M_YW3XuvIw

The Chanel contains a set of Videos filmed at the Stony Brook TV Studio covering the material included in Chapter 1 to Chapter 4 of the course Textbook.

Please use them for review and extra study during the semester.

Course webpage contains two types of Lectures.

1. Class Lectures that are very detailed, not too long, containing many examples, exercises, and homework problems solutions. Usually there are 3-5 of them for one Chapter of the book.
L2. **Video Lectures** are less detailed and were created especially for the Book Chapters Videos. Students can watch the Youtube Videos chapter by chapter, with exactly the same slides in hand as those used in them.

Both types of Lectures closely follow the book.

**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.

**Testing**

- All TESTS and the FINAL Examination will be given IN CLASS.
- NO MAKE-UP TESTS except of documented cases of illness or documented emergencies.
- Make-up exams will be given only in extenuating circumstances. For example, doctor’s note stating that you were ill and unfit to take the exam. Students who miss an exam for a valid reason must contact the instructor immediately to take a make-up exam at the earliest possible time. Specific arrangements will be made on a case-by-case basis.

**Grading and Course General Information**

There will be THREE tests: **Midterm 1, Midterm 2**, and a **Final**. All tests are CLOSED NOTES and CLOSED BOOK. If a student is found using notes or a book during a test, he/she will receive AUTOMATICALLY 0 pts for a given test.

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

- **Homework assignments:** there will be four (4) homework assignments. Look below for the homework assignments. **None of them will be collected or graded.** Students are responsible for solving the problems and will be tested of their homework work by respective quizzes.

- **Solutions** to almost all of assigned homework problems are included in posted solutions of past Quizzes and Tests and in the Class Lectures.

- **Tests** cover Class Lectures and Homework assignments only for the portion of material that was covered before the dates of tests.

- **Records** of students points are kept on the Brightspace.

You have to contact TAs when you have questions about grading and your grade.

**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).
GRADING COMPONENTS
Midterm 1 - 60pts
Midterm 2 - 60pts
Final - 80pts

Final Grade Computation
None of the grades will be curved.

You can earn up to 200 points during the semester.

The % grade will be determined in the following way: # of earned points divided by 2 = % 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%

PRELIMINARY TESTS SCHEDULE
This is a preliminary schedule. The changes and updates, if any, will be advertised in the GENERAL NEWS section the course webpage

MIDTERM 1 Tuesday, October 3
Fall Break October 9 - October 10
MIDTERM 2 Tuesday, November 14
Thanksgiving Break November 22 - November 26
Last Day of classes December 11
FINAL during Final Period - December 12 -21

Final Grade Computation
Attention: None of the grades will be curved.

Records of students points are kept on the Brightspace

You have to contact TAs when you have questions about grading and your grad

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 - Reading from Additional Textbook

Homework Assignments

Tests and Quizzes cover Homework assignments for the portion of material was covered in class

Homework 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 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, 2.2.9, 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 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.


Problems: Page 135: 3.3.1, 3.3.2,  Page 148: 3.5.1, 3.5.2 a,b (extra credits).

Make-up Exams

Make-up exams will be given only in extenuating circumstances (e.g., doctor’s note stating that you were ill and unfit to take the exam). Students who miss an exam for a valid reason must contact the instructor immediately to take a make-up exam at the earliest possible time; specific arrangements will be made on a case-by-case basis.

Student Accessibility Support Center Statement

If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the Student Accessibility Support Center, 128 ECC Building, (631) 632-6748, or via e-mail at: sasc@stonybrook.edu. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

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

SASC  Student Accessibility Support Center
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Critical Incident Management
Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students’ ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.