

Syllabus

Course Number: CS 475

Course Title: Computation Theory

Course Description:

Studies various computational forms including Automata, Lambda Calculus, Turing Machines, Recursive Functions and emerging theories. Explores the association of formal languages and computation. Introduces NP and NP Complete problems and limits on computation.

Prerequisite Courses:

MT320 – Introduction to Discrete Mathematics

CS390 – Principles of Programming Languages

Course Overview

This course introduces formal, mathematical models of computers and computation. It will show how limitations to computation can be shown to exist.

Course Outcomes:

Upon completion of this course, learners should be able to:

1. Explain the concept of language as used in theoretical computer science.
2. Explain and use regular expressions to represent languages.
3. Compare and contrast among regular expressions, finite state automata, nondeterministic finite automata, pushdown stack automata, and Turing machines.
4. Create and use finite-state, nondeterministic finite, pushdown automata & Turing machines.
5. Define and explain context-free grammars.
6. Define and explain the significance of P, NP, and NP-complete classes and the significance of tractability.
7. Describe the Chomsky hierarchy of regular, context-free, context-sensitive, and recursively enumerable.
8. Compare and contrast among Turing Machine, Lambda Calculus, and Recursive Function models of computation.
9. Explain the Church-Turing hypothesis and Cook's Theorem.

Course Materials:

Required Texts:

Cohen, Daniel. (1997). *Introduction to Computer Theory, 2nd Edition*. New York, NY: John Wiley & Sons, Inc. ISBN: 0-471-13772-3.

Pre-Assignment:

Read Chapters 1 - 3 in the textbook.

Online Format: Sign on to worldclass.regis.edu and become familiar with the course navigation of the Web Curriculum. Complete assignments above.

Classroom-based Format: Complete assignments above by the first night of class.



Course Assignments and Activities:

	Topics	Readings	Activities Assignments and Associated Points
1	Introduction to the Theory of Computation	Chapters 1 – 3	Participation in Discussions - 10% for entire course Assn #1: Using languages – 6.25% Due: Online: Midnight, Sunday Classroom: Before 2 nd class
2	Regular Expressions and Finite Automata	Chapters 4 & 5	Participation in Discussions Assn #2: Using regular expressions – 6.25% Due: Online: Midnight, Sunday Classroom: Before 3 rd class
3	Nondeterministic Finite Automata	Chapter 6 Chapter 7, pp. 135-140	Participation in Discussions Assn #3: Creating automata – 6.25% Due: Online: Midnight, Sunday Classroom: Before 4 th class
4	Kleene's Theorem	Rest of Chapter 7	Participation in Discussions Assn #4: Using * or + closure – 6.25% Due: Online: Midnight, Sunday Classroom: Before 5 th class
5	Regular Languages and Decidability	Chapter 9, pp. 169-185 Chapter 11, pp. 207-217 Wikipedia (lookup): Cook-Levin theorem & NP-Complete	Participation in Discussions Assn #5: Using regular languages – 6.25% Due: Online: Midnight, Sunday Classroom: Before 6 th class Midterm exam – 20%
6	Nonregular Languages and Context Free Grammar	Chapter 10, pp. 187-196 Chapter 12, pp. 224-254 Chapter 13, pp. 259-265	Participation in Discussions Assn #6: Using grammars – 6.25% Due: Online: Midnight, Sunday Classroom: Before 7 th class
7	Push Down Stack Automata	Chapter 14 Chapter 15	Participation in Discussions Assn #7: Stack demonstration – 6.25% Due: Online: Midnight, Sunday Classroom: Before 8 th class
8	Turing Machines	Chapter 19, p. 434, Chapter 25, pp. 610 – 612	Participation in Discussions Assn #8: Trace Turing execution – 6.25% Due: Midnight Sunday Final exam – 20%
		Total	100%

Student Evaluation Summary

Assignment	Value (percent of overall course grade)
Assigned homework (8 at 6.25% each)	50%
Participation in Discussions (8 weeks)	10%
Midterm	20%
Final	<u>20%</u>
TOTAL	100 %

Course Policies and Procedures

Late Policy

Late assignments will be graded and then 3% will be deducted for each day the assignment is late, up to 1 week late. **Assignments will NOT be accepted more than 1 week after the official due date.** Therefore, any assignment turned in more than 1 week late will be given a grade of zero, and no feedback will be given.

Participation

Class participation/effort is important because we can all learn from each other. Your participation points can make a difference in the final grade. Participation means:

- a. Present in class every session (classroom)
b. Present in the forum every week (online)
- a. Effectively responds to questions from the facilitator (classroom)
b. Regularly checks forum and posts all required items by the deadlines (online)
- Interacts/replies to other students in classroom/forum discussions.

Adding this course during the Drop/Add Period

If you added this course during the drop/add period, after class began on Monday, you are responsible for **immediately** notifying the instructor that you joined the course late. None of the course due dates will be extended for you. Even if a due date already passed when you added the course, late points will still be deducted.

Plagiarism

Plagiarism includes submitting anything that was obtained from any other person, publication, or any internet web source. **All work submitted in CS475 must be your own.**

In cases of suspected cheating or plagiarism, the instructor will discuss the matter with the student(s) involved. The instructor reserves the right to question any student orally or in writing about any assignment, and to use the evaluation of the student's understanding of the assignment and of the submitted solution as evidence of cheating.

All cheating incidents will be reported to the Computer Science department, and may also be reported to the Academic Integrity Board for further action.

CC&IS Grading Scale

Letter Grade	Percentage	Grade Point
A	93 to 100	4.00
A–	90 to less than 93	3.67
B+	87 to less than 90	3.33
B	83 to less than 87	3.00
B–	80 to less than 83	2.67
C+	77 to less than 80	2.33
C	73 to less than 77	2.00
C–	70 to less than 73	1.67
D+	67 to less than 70	1.33
D	63 to less than 67	1.00
D-	60 to less than 63	.67
F	Less than 60	0

Additional information about grading can be found in the latest edition of the University Catalog, available at <http://www.regis.edu/Academics/Course%20Catalog.aspx>

CC&IS Policies and Procedures

Each of the following CC&IS Policies & Procedures is incorporated here by reference. Students are expected to review this information each term, and agree to the policies and procedures as identified here and specified in the latest edition of the University Catalog, available at <http://www.regis.edu/Academics/Course%20Catalog.aspx> or at the link provided.

- The CC&IS Academic Integrity Policy.
- The Student Honor Code and Student Standards of Conduct.
- Incomplete Grade Policy, Pass / No Pass Grades, Grade Reports.
- The Information Privacy policy and FERPA. For more information regarding FERPA, visit the [U.S. Department of Education](http://www.ed.gov).
- The HIPAA policies for protected health information. The complete Regis University HIPAA Privacy & Security policy can be found here: <http://www.regis.edu/About-Regis-University/University-Offices-and-Services/Auxiliary-Business/HIPAA.aspx>.
- The Human Subjects Institutional Review Board (IRB) procedures. More information about the IRB and its processes can be found here: <http://www.regis.edu/Academics/Academic-Grants/Proposals/Regis-Information/IRB.aspx>.

The CC&IS Policies & Procedures Syllabus Addendum summarizes additional important policies including, Diversity, Equal Access, Disability Services, and Attendance & Participation that apply to every course offered by the College of Computer & Information Sciences at Regis University.

A copy of the CC&IS Policies & Procedures Syllabus Addendum can be found here:
<https://in2.regis.edu/sites/ccis/policies/Repository/CCIS%20Syllabus%20Addendum.docx>.

