COSC 440 - Theory of Computation

Fall 2018
Syllabus

What's this math doing in my computer science?

Just the Facts

Course Number: COSC 440
Title: Theory of Computation
Semester: Fall 2018
Meeting Time: TR 10-11:50am
Locale: Schaefer 161
Instructor: Alan Jamieson
Office: Schaefer 154
Office Hours: TR 1-2pm, T 4-6pm
Email: acjamieson@smcm.edu
Google Messenger: acjamieson@smcm.edu
Slack: via COSC440 Group
Online Office Hours: Most evenings and weekends
Textbook: *Sipser, Introduction to the Theory of Computation, Third Edition, Thompson.*
Website: http://ripark.github.io/f18/cosc440.html

Catalog Description: This course examines the mathematical models underlying computer science. Topics include: finite automata; regular languages and regular grammars; context-free languages; simplification of context-free grammars and normal forms; push-down automata; Turing machines; limits of algorithmic computation; and NP-completeness. Prerequisite: COSC 201 and MATH 200/281.

Overview: In this course you will be learning that sometimes computer science isn't about computers. You'll be exposed to all of the mathematical structures that form the basis of modern computer science and how to apply and manipulate models of computing all the way to Turing machines and the variety of problems that are tractable and intractable with our current view of computing. Better yet, there will be little or no programming in the course.

Purpose: One of the things that tends to escape most computer science undergrads is the fact that most of computer science is actually, hold on to your horses, mathematics. Almost all of the foundations that computer science are built upon are mathematical constructs. Funny huh? The purpose of this course is to expose you to all the wonderful background stuff that you never knew you wanted to know about the computers you love to hate. These concepts are fundamentals on which modern computing is built and has application in virtually all fields.

Grade Distribution:

Written Assignments/Projects (2) - 15% each
Homework - 15%
Participation - 5%
Midterm 15%
Quizzes - 5%
Presentation - 10%
Final - 20%

The class will be run fairly informally. While there will be some amount of traditional lecture involved with each class period, I expect there will be less traditional discussion also involved in each class period involving questions and concepts being batted back and forth amongst you, your peers and myself. Please participate in these discussions, I can almost guarantee that you'll get more out of the class in general if you do.

Learning Objectives: At the completetion of COSC 440, students will be able to:

implement finite state automata.
implement regular grammars.
implement context-free grammars.
implement Turing machines.
differentiate various computation problems based on complexity.
design proofs for complexity for various problems.

Final Information: The final will be held Wednesday, December 12 from 10:00a.m-12:15 p.m. in SH 161. Except in emergency situations, you will be required to take the final exam at this time.

Written Assignments/Projects: There will be two written assignments/projects in this course. One will be a significant paper (length to be noted in the actual assignment) and will require you to do a good amount of research into the topic. Be prepared to spend time in the library and learn the ins and outs of dealing with the wide variety of resources available there. Wikipedia will not save you. The second will be a creative project, specified in the project document and presented in class.

Blackboard Use: I will be utilizing Blackboard primarily for your grades in this course.

Policies

Cell Phones: Please, turn off or turn to silent any cell phones prior to getting to class. If they go off in class they are distraction not only to myself, but to everyone else in the class as well. Habitual offenders will be excused from the class with a 0 for any quizzes that day.

Computer Use: Computer use in this lab is for academic use only. If you bring a laptop with you to this class I expect you to be only using it for purposes related to this class. The same goes for the computers in this lab.

Attendance and Tardiness: Attendance is highly recommended. Missing a class not only causes you to miss the information disseminated in that lecture, but can cause you to miss important information in regards to exams and assignments and the potential of receiving a 0 for a quiz that day. I start class promptly on the hour and expect the students to be in class at that time. If you have circumstances that can prevent you from being in class on time, please let me know as soon as possible. Habitual offenders will be excused from the class with a 0 for any quizzes that day.

Exams and Quizzes: Exams are scheduled well ahead of time. The current schedule shows what days I believe I will be issuing an exam. Any changes to this schedule will be noted and explained in class, well ahead (approx. 1 week) of the exam affected. Exams will not be rescheduled and I will not be offering make-up exams except under extraordinary and documented circumstances. Every class has the potential of having a quiz to reinforce the ideas from the lecture the previous class. These will not be announced ahead of time. They will be 1-3 question quizzes that can be easily done in 15 minutes either at the start or the end of the class period.

Assignments: Assignments and other outside of class work should be done on an individual basis unless otherwise specified in the description of the assignment. Assignments and other outside of class work will be taken late only under the conditions listed in the Late Policy section.

Late Policy: You are allowed 2 "slip-days" throughout the semester. This means that you may turn in an assignment late, where each day it is late will reduce your number of slip-days by 1. So, you could turn in a project 2 days late, but then you wouldn't have any further slip-days left for the rest of the semester. Once you are out of slip-days, if you turn in the assignment late, you will earn a 0 for that assignment. As a further encouragement to turn in assignments on-time, each slip-day you have left at the end of the semester will add 0.5% to your final average. You may not use a slip day for the second project.

Extra Credit: I may or may not be offering any extra credit opportunities in this class.

Final Exam: The final exam in this class is optional. You may take it if you wish in order to attempt to improve your grade. Regardless if you choose to take the final or not, every student is required to attend the final period. Failure to attend the final exam scheduled, whether or not you are intending to take the exam, will result in a 0 assessed for your final exam and factored in to your grade.

Communication: The simplest way to get in touch with me is by coming by my office during my office hours or contacting me via email. The easiest way to get in touch with me "after hours" is to send me an email. I habitually check my St. Mary's email account all hours of the day. If you come by my office and the door is open, feel free to stop in to chat. The open door indicates that I'm not working on anything that has to keep my undivided attention at that time so do not feel that you are interrupting me or anything like that. I do make appointments if you have a certain time that you'd like to meet with me. If it fits in my schedule (meaning I'm not teaching class during that time) I will be happy to meet with you.

Academic Honesty: Academic misconduct policies are covered in the Student Code and Student Rights and Responsibilities, Article III. Pay close attention to the definitions of academic misconduct noted in Section 1. This can be found in the Student Handbook.

Disability: If you have any kind of disability that can affect your performance in this class, please let me know privately through email or stopping by my office.

Schedule: The schedule for the class will be posted to the class website. The schedule is subject to change (multiple times).

Closing: The most important thing in any of my classes is that you are learning and expanding your horizons. If you are having any undue difficulty with your work as it pertains to this class, please contact me as soon as possible. Always remember that professors win when you don't need us any longer. I want you to be bouncing ideas off of each other throughout the class and it is my hope that by the end of the semester that you are driving the class session rather than me.