CSCI 2210: Theory of Computation

Bowdoin College

Fall 2023

Online Presence

web: tildesites.bowdoin.edu/~e.morehouse/courses/theory_of_computation/

slack: bowdoin csci 2210

Meetings

Mondays and Wednesdays at 10:05–11:30 in Searles 223

Instructor

Ed Morehouse (e.morehouse@bowdoin.edu)
office: Searles 202
hours: Tuesdays, Wednesdays, Thursdays 2:00–3:30 or by appointment

Learning Assistants

Homer LaBranche,
Athis Osathapan

Course Description

In this course we will study the concept of a *model of computation* and learn how to reason about the properties of such models. We will introduce machine-based models such as *finite state automata* and *Turing machines*, as well as language-based models such as *context-free grammars* and λ-*calculus*, and we will examine the relationships that hold between them. In the latter part of the term students will have the opportunity to research and present a model of computation of their choice.

Learning Goals

Upon completion of this course students can expect to be able to:

- understand presentations of various models of computation,
- reason about the properties of such models,
- understand the concept of effective computability, as expressed by the Church–Turing thesis.

Course Structure

The main components of the course are the following.

lectures: Most course meetings will include a lecture, which introduces new theoretical concepts together with examples of their application.

readings: There will be assigned weekly readings that include more detailed presentations of the concepts introduced in the lectures.

homework: There will be periodic homework assignments designed to build experience and competence with the concepts presented in the course. These allow students to receive early feedback on how well they seem to be understanding the material and provide an opportunity to seek clarification if needed.

exams: There will be two in-class midterm exams serving as assessments of student progress in understanding the main course material.

project: In lieu of a final exam, students will research a model of computation of their choosing, write a summary of its specification and properties, and present a report to the class on their findings.

Student Evaluation

Course grades are determined from several components, weighted as follows:

Homework Problem Sets	40%
Midterm Exams	40%
Final Project	20%

To account for mild illness, scheduling conflicts, etc., students are granted a *late day* budget for assignment submissions in this course. You have a budget of 5 late days that you may use at your discretion for any assignment deadline. Each late day grants you an extension of 24 hours. If you exhaust your supply of late days and still find yourself struggling to meet deadlines then you should schedule an appointment with the instructor to discuss the situation.

Academic Integrity

Collaboration and learning from one another are encouraged, while copying answers and cheating are forbidden. You are expected to be able to distinguish the two. If you are contemplating an action, and you're not sure into which category it falls, you should consider whether what you intend to submit for evaluation is the product of your own efforts and represents your own understanding of the concepts involved. If it is/does not, then you should not submit the work as your own.

The Computer Science Department maintains a Collaboration Policy. In this course homework assignments should be considered collaboration level 1 and exams level 3. Moreover, Bowdoin College imposes an Academic Honor Code, which you are expected to abide by in all of your courses, including this one.

Academic Accommodations

The course staff is committed to fostering an accessible and inclusive learning environment where all students feel welcome, comfortable, and treated fairly. If you have any concerns or suggestions for improvement, or would like to request an individual accommodation, please let us know.