



HAMPDEN-SYDNEY COLLEGE

Computer Science 461: Theory of Computing (3 credits) Spring 2025

Instructor	Brian Lins
Email Address	blins@hsc.edu
Course Meeting Time	MWF 1:30 - 2:20pm
Course Meeting Location	Pauley 100
Office Hours	Wednesdays 2:30 - 4:00pm & Thursdays 1:00 - 2:30pm See the course website: https://bclins.github.io

Course Description

An introduction to theoretical computer science. Abstract models of computers are used to help investigate the limitations of computing. Topics may include computability, complexity, automata, formal languages and grammars, and the Chomsky hierarchy. Prerequisites: Computer Science 262 and Mathematics 254.

Course Learning Objectives

- Learn the definitions and limitations of models of computation including finite automata, context-free grammars, and Turing machines.
- Learn the connection between models of computation and formal languages.
- Understand computational complexity classes including P, NP, and NP-complete.
- Gain experience with creative mathematical problem solving and develop the ability to write correct, clear, and concise mathematical proofs.

Required Materials

None. See the course website for links to the free textbook.

Attendance Policy

Attendance in this class is required. Repeated absences may result in a forced withdrawal from the course. You are responsible for any material you miss due to absence. Please let me know ahead of time if you know that you will not be able to attend class.

Grading Policy

The term grade will be based on the following factors.

Component	Proportion
Homework	40%
Midterms	30%
Final Exam	30%

Homework

There will be homework problems assigned every week. These will typically be collected on Mondays. I will drop the lowest homework grade. Late homework will only receive a fraction of the full possible grade.

Exams

There will be three in-class midterm exams and a cumulative final. These exams will be announced in advance, and you will know exactly what concepts will be covered on each exam.

Course Schedule

The schedule below is tentative, and may be subject to change. Changes will be announced in class, and you are responsible for knowing about any changes even if you miss the class when they are announced.

Week	Topic
1	Boolean circuits
2	Finite automata
3	Nondeterministic finite automata
4	Regular expressions & languages
5	Pumping lemma, Midterm 1
6	Context free languages
7	Pushdown automata
8	Pumping lemma 2
9	Turing machines
10	Decidability, Midterm 2
11	Enumerability
12	Complexity theory
13	Nondeterministic algorithms
14	NP-completeness, Midterm 3

Late Work and Make-Up Assignment Policy

Please let me know in advance if you will be missing class. Late homework assignments may be accepted with a grade penalty.

Student Learning Outcomes

As part of a major offer by the Math & Computer Science department the SLOs for this course are:

- **Problem solving** - Students will be able to apply appropriate principles and techniques to solve problems.
- **Rigor** - Students will be able to read and construct mathematical proofs, and to provide counterexamples to false propositions.
- **Written communication** - Student will be able to communicate mathematical information in a clear and concise manner in standard written English to both a technical and non-technical audience.

Grading Scale

This course adheres to the grades and quality points described in the Academic Catalogue. Consult the Academic Catalogue for a detailed description.

Honor Code

Students are expected to abide by the Honor Code for all assignments unless a professor indicates otherwise. Students should consult the Academic Catalogue and The Key: The Hampden-Sydney College Student Handbook for the College's description of the Honor Code and what it identifies as infractions of the Honor Code.

Artificial Intelligence Policy

Artificial intelligence (AI) generators and large language models (LLMs) often rely on existing published materials, and copying or paraphrasing materials generated by AI without attribution is plagiarism. Professors may permit students to use AI generators or LLMs in a variety of ways in their own classes. Those students, however, must not assume that those policies transfer to other classes.

Accommodations

Hampden-Sydney College is committed to ensuring equitable access to its education programs for all students. Under the administration of Culture and Inclusion, the Office of Accessibility Services (OAS) coordinates reasonable accommodations for qualified students with disabilities. If you wish to seek accommodations for this class, please contact Dr. Melissa Wood, Director of Title IX, Access, and Inclusion, at 434-223-6061 or at mwood@hsc.edu. Additional information may be found here: <https://www.hsc.edu/academics/academic-services/disability-services>. Appropriate documentation of disability will be required. For students who have an accommodations letter from OAS, it is essential that you correspond with your professor as soon as possible to discuss your accommodation needs for the course so that appropriate arrangements may be made.