COMPSCI 250 Syllabus, Fall 2024

COMPSCI 250 is the undergraduate core course in discrete mathematics and deals with logic, elementary number theory, proof by induction, recursion on trees, search algorithms, finite state machines, and a bit of computability.

The two lectures each day will be very similar and use very similar lecture slides. Lecture 250-01 (Dave) meets MWF 1:25-2:15 p.m. in Goessmann 20. Lecture 250-02 (Mordecai) meets MWF 10:10-11:00 a.m., also in Goessmann 20. The sections will have the same homework and exams, and will use a single Canvas site.

There are nine discussion sections each Wednesday:

- 250-01AA, 8:00-8:50 a.m., Flint 105
- 250-01AB, 10:10-1100 a.m., Flint 105
- 250-01AC, 11:15 a.m.-12:05 p.m., Flint 201
- 250-01AD, 12:20 p.m.-1:10 p.m., Flint 105
- 250-01AE, 4:00-4:50 p.m., Hasbrouck 137
- 250-02AA, 9:05-9:55 p.m., Flint 105
- 250-02AB, 11:15 a.m.-12:05 p.m., Flint 105
- 250-02AC, 1:25-2:15 p.m., Flint 105
- 250-02AD, 2:30-3:20 p.m., Flint 105

Instructor Contact Info:

David Mix Barrington, 210 Computer Science Building, 545-4329, private zoom number 459 532 6175, office hours for Fall 2024: TBA

Mordecai Golin, A143 LGRC, office hours for Fall 2024: TBA

The best way to contact either Dave or Mordecai is by email. Dave will usually eventually answer email at barring@umass.edu, but not as quickly.

TA and UCA Contact Info:

- TA Ankur Aditya, office hours TBA
- TA Sabrina Zaman Ishita, office hours TBA
- TA Shreyas Kulkarni, office hours TBA
- TA Hector Tierno, office hours TBA
- TA Yuncong Yang, office hours TBA
- TA Haoyu Zhen, office hours TBA
- All TA office hours are in LGRT 220 except when announced otherwise
- UCA's Elena Li elenali@umass.edu (head TA), Alec Kurth akurth@umass.edu (head TA), Tomas Acuna, Takuto Ban, Johnathan Ferdinand, Skye Iley, Toby Kahn, Meenakshi Iyer, Daisy Labonte, Quang Hung Nguyen, Agneshka Rohra, Riddhimaan Senapati.

This course is primarily intended for undergraduates in computer science and related majors such as informatics, mathematics or computer engineering. CICS 160 (using data structures) and MATH 132 (Calculus II) are prerequisites and are pretty strictly enforced.

The four-credit course meets for three lecture meetings a week, Monday, Wednesday, and Friday. Mordecai will lecture 10:10-11:00 in Goessmann 20 and Dave will lecture 1:25-2:15 p.m., in ELAB II Room 119 -- the lectures will be similar and will follow the textbook pretty closely. Both lecture sections of the course will have the same assignments, exams, and grade scale.

The schedule below indicates which lectures and discussions happen which days, which sections of the book to which they refer, and when the homework assignments are due.

There is one discussion meeting per week for each of the nine sections, at various times on Fridays before lecture as indicated on SPIRE. Each discussion will have a written assignment which you will carry out in groups. Discussion

attendance is required, so that missing a discussion will incur a grade penalty. The TA's and instructors will cover the sections in various combinations, so they will be as interchangeable as we can make them.

The course is using the Canvas course management system and the Piazza system for student discussion. We will also use a free system called ClassQuestion, which replaces the iClicker system we used in prior years. They will be used in grading only for classroom attendance. Basic information about the course will be on this site, and specifics of the course will be off of the Canvas main page once it is established.

Course Objectives:

This is a course about **mathematical proof** -- how and why to prove things about the objects of digital computation. In order to write programs, you need to think clearly about them, and the techniques of mathematical proof are an essential tool for that. The single most important tool is **mathematical induction**, which allows us to prove statements about any system that is defined in terms of itself. The natural numbers are the most familar such system, but in computing we create other structures by **recursive definition**, and process them with **recursive algorithms**. We show you recursion and induction using a variety of systems that are used in actual computation.

Learning Outcomes:

This page lists specific things that might be asked on a final exam.

Textbook:

The textbook is the current draft of Dave's in-progress book, *A Mathematical Foundation for Computer Science*. This is available as an e-book from Kendall Hunt Publishing (last year for $60, probably a bit more this year). It has an "assessment package" where you will need the current version of the book to answer quiz questions. The book and package can be obtained from the eCampus site or directly from Kendall Hunt. (Dave does not get royalties for purchases from students in the course -- they are contributed to the David Mix Barrington Scholarship in Computer Science.)

Schedule:

This page indicates the dates and topics of each lecture and discussion, including the sections of the textbook used in each.

Course Requirements and Grading

Your grade in COMPSCI 250 will be based on the following:

- **Midterm Exams (30%):** There will be two midterm exams each counting 15% of your grade, on Thursdays 10 October and 7 November, each 7-9 p.m., in rooms to be decided. We will write an exam intended to be finished in an hour, and give you two hours to finish it. (Over the years students have accused Dave, at least, of overestimating what they ought to be able to finish in an hour.) We will provide a separate room with proctoring for extended time exams, for people with Disabilities Services accomodations, from 5-9. The exams from Fall 2023 and from other semesters may be used as practice exams.

- **Final Exam (35%):**This will be during the December final exam period as scheduled by the University, and will be cumulative, though with greater emphasis on the last third of the course. You will have two hours. The Spring 2023 250 final (with solution here) may be used as a practice exam. The learning goals page for the course is essentially an outline of the tasks that might be asked for in the final exam.

- **Homework (20%):** There will be six homework assignments during the term, due at 11:59 pm on the following days, mostly Fridays:

    - HW#1: Friday 20 September
    - HW#2: Friday 4 October
    - HW#3: Friday 18 October

- HW#4: Friday 1 November
- HW#5: Friday 22 November
- HW#6: Tuesday 10 December (The lowest grade will be dropped.) Homework must be turned in as PDF files on the Gradescope site for the course. This will allow the TA's to grade it and give you feedback without the necessity of moving large quantities of paper around. PDF files may be generated in a variety of ways -- I would probably do it using Latex, but Word and other word processing software has options to produce PDF's. (On a Mac, any print command has a "save PDF" option.) You can also scan a handwritten document to produce a PDF which you can then turn in. (But what you submit *must* be readable -- you are responsible for reviewing your PDF yourself to see that it is. Cel phone pictures of bad handwriting will in general not work.)

  For full credit, homework must be submitted by the deadline. Late homework will be accepted up to 24 hours after the deadline, with a 20% penalty unless (a) the penalty is waived for some reason or (b) this assignment is the best of your late homeworks. Students with Disability Services accommodations may use the late day with no penalty. Work after the late day will in general not be accepted -- we'll deal with valid excuses by giving "excused" grades on particular assignments.

- **Discussions (6%):** Attendance at the Wednesday discussion sections is required and this portion of the course grade will be based on your attendance and participation. Participation will be measured by group responses to in-class writing assignments, usually based on "Excursion" sections of the text. You will be divided randomly into groups of 2-4 people and each group will hand in a response to the assignment. These will be graded "check" (B) or "check-plus" (A), and the best nine of your eleven will count for 6% of your total grade. (There are ten in-class discussions and one more, an extra course evaluation to be submitted at the end of the term.)

- **Textbook Quizzes (6%):** These short *true-false* exercises will occur once a week, due at 8:00 pm every Tuesday, except those with exams or Thanksgiving break:

  - Quiz 1: 17 Sept (1.1, 1.2, 1.4, 1.5, 1.6, 1.7)
  - Quiz 2: 24 Sept (1.8, 1.10, 2.1, 2.3, 2.5)
  - Quiz 3: 1 Oct (2.6, 2.8, 2.10, 2.11)
  - Quiz 4: 15 Oct (3.1, 3.3, 3.4, 3.5, 3.6, 4.1)
  - Quiz 5: 22 Oct (4.3, 4.4, 4.7)
  - Quiz 6: 29 Oct (4.9. 4.11, 9.1, 9.3)
  - Quiz 7: 12 Nov (9.4, 9.5, 9.6, 9.8, 9.9, 9.10, 5.1, 5.2)
  - Quiz 8: 19 Nov (5.4, 5.5, 14.1, 14.2)
  - Quiz 9: 3 Dec (14.3, 14.5, 14.6, 14.7, 14.8)
  - Quiz 10: 10 Dec (14.10, 15.1, 15.6, 15.8)

  They will cover the material of the previous week's lectures. You will do them using the "assessment package" of the textbook, so you will need a current version of the textbook. Some small number of the quiz grades will be dropped -- the remainder will count for 6% of the total grade. A typical quiz will be 20 questions, with the grade being F for not doing it, C for half right (the expected result of guessing), and A for all right.

- **In-Class Questions (3%):** During most lectures there will be questions to be answered on a free clicker device on your phone (see this site). (This is the only sense in which lecture attendance affects your grade.) The first questions that count will be on Friday 9 February, the fourth lecture, so that you should have time to arrange to get the device. As we have had it lately, *only participation* for grading clicker scores. There will be *no excused absences* for lecture attendance, but a large number of grades will be dropped. There will be a total of 108 in-class questions to be answered, and 80 or more will get full credit.

Calculation of Grades

My (Dave's) system for computing grades is a bit unusual, so I will try to explain it here. I take every graded component of the course and assign it a number on a scale from F (0) through C (200) to A (400) and sometimes higher. These are the numbers that are averaged together by Moodle to get your "course total" at the end of the term, and this is the basis for your letter grade. (For example, if your course total is 342, the closest letter grade to this is a B+ (333) so that's what you get. There is some provision for rounding up in close cases, since a 345 is within five points of the boundary (350) between A- and B+, I would give that an A-. Please don't whine about the exact boundaries.

For exams and homeworks, there is thus both a raw score, typically ranging from 0 to around 100, and a normalized score on the 0-400 scale. The mapping from raw score to normalized score does *not* always take 0 to 0. A typical scale for a homework assignment takes 30 (and lower) to 0, 45 to 100, 60 to 200, 75 to 300, 90 to 400, and higher grades above 400 by the same linear function. On each assignment, we decide *after grading* what raw score constitutes a 200, and what score a 400, then find the linear function that meets those two points.

Academic Honesty Policy:

All work submitted must be your own **in presentation**. How much outside help is allowed depends on the course component.

- The exams are closed-book and no outside help is allowed. **Any** cheating on an exam is grounds for an F in the course.
- With homework the rule is a bit harder to specify. You **may** discuss homework with other students, in fact we encourage this as a learning experience. But again, the writeup must be your work. Copying is not allowed, and collaboration so close that it **looks like** copying is not allowed. (In general, if we get two identical homeworks we will accept neither of them (i.e., both get F's) and we will report this action to the Academic Honesty Board.) Remember to **tell us who you worked with** as well.

  A good practice is to divide your work into an "ideas phase" where you collaborate and a "writeup phase" where you work alone -- enter the writeup phase with notes, but not written solutions.

- If you make use of a printed or on-line source for the homework, other than specific course materials such as the textbook or web site, please **mention it in your writeup**. Of course copying a solution to a problem from the web, or from solutions given out in prior semesters, is cheating, and this is easier for us to detect than you might think.
- You are free (and encouraged) to discuss answers to discussion and clicker questions, and to work together on Moodle quizzes.
- Lastly, the University has noticed the existence of AI tools like ChatGPT, and the Academic Honesty Policy prohibits them unless an instructor explicit allows them. We don't allow them here. A major goal of this course is to develop your ability to present mathematical arguments, and we want to evaluate *your own* performance in that regard.

Accommodation Statement:

The University of Massachusetts Amherst is committed to providing an equal educational opportunity for all students. If you have a documented physical, psychological, or learning disability on file with Disability Services (DS), you may be eligible for reasonable academic accommodations to help you succeed in this course. If you have a documented disability that requires an accommodation, please notify me within the first two weeks of the semester so that we can make appropriate arrangements. For more information, consult the Disability Services website at http://www.umass.edu/disability/.

Inclusivity Statement:

We celebrate the diversity in our community and actively seek to include and listen to voices that are often silenced in the computing world. We welcome all individuals regardless of age, background, citizenship, disability, sex, education, ethnicity, family status, gender, gender identity, geographical origin, language, military experience, political views, race, religion, sexual orientation, socioeconomic status, and work experience.

Names and Pronouns:

Everyone has the right to be addressed by the name and pronouns that they use for themselves. You can indicate your preferred/chosen first name and pronouns on SPIRE, which appear on class rosters. I am committed to ensuring that I address you with your chosen name and pronouns. Please let me know what name and pronouns I should use for you if they are not on the roster. Please remember: A student’s chosen name and pronouns are to be respected at all times in the classroom.

Title IX Statement:

UMass is committed to fostering a safe learning environment by responding promptly and effectively to complaints of all kinds of sexual misconduct. If you have been the victim of sexual violence, gender discrimination, or sexual harassment, the university can provide you with a variety of support resources and accommodations If you experience or witness sexual misconduct and wish to report the incident, please contact the UMass Amherst Equal Opportunity (EO) Office (413-545-3464 | equalopportunity@admin.umass.edu) to request an intake meeting with EO staff. Members of the CICS community can also contact Erika Lynn Dawson Head, director of diversity and inclusive community development (erikahead@cics.umass.edu | 860-770-4770).

Learning Support:

Along with the staff and the textbook, there are additional support resources for the course.

- The Learning Resource Center, including Noam Gans (ngans@umass.edu), who leads Supplemental Instruction sessions for COMPSCI 250 this term.
- The Assistive Technology Center
- Disability Services
- Student Success
- Center for Counseling and Psychological Health
- English as a Second Language (ESL) Program
- CMASS Success Coach Program
- Single Stop Resources

Last modified 20 September 2024