Textbook
Required: Algorithm Design by Jon Kleinberg and Eva Tardos

Class Time and Office Hours
• Class meets MTH 1:10pm - 2:30pm
• Lab meets TH 2:40pm - 4pm
• Office hours M 2:40pm - 4pm on Slack
• TAs:
  – Yichun Cao, Sundays 8pm - 10pm on Slack
  – Chen Fan, Wednesdays 9am - 11am on Slack
  – Duc Trinh, Saturdays 9pm - 11pm on Slack
• Check the class website often for updates. Deadlines will also be listed there.

Remote Learning Resources
• Class website: [www.cs.brynmawr.edu/cs340](http://www.cs.brynmawr.edu/cs340)
• Moodle: assignment submissions
• CS server: lecture notes, program data and other handouts
• Zoom: lectures, labs and one-on-one meetings
• Slack: you will receive an invitation to join a class channel. This is the place to look for me or a TA if you have a question. Appointments for one-on-one Zoom meetings should be made here too.
• Ziteboard: online whiteboard for real-time collaboration

Learning Goals
Students who complete the course will have demonstrated the ability to do the following:
• Analyze the asymptotic performance of algorithms.
• Write rigorous correctness proofs for algorithms.
• Demonstrate a familiarity with major algorithms and data structures.
• Apply important algorithmic design paradigms (Greedy, Divide-and-Conquer, Dynamic Programming, major graph algorithms and approximation algorithms) and methods of analysis.
• Synthesize efficient algorithms in common design situations.

Prerequisites
All three of the following courses (or their equivalents at Haverford or Swarthmore) are required with a grade of 2.0 or better (or permission of the instructor).

1. CS 110/113/115
2. CS 206
Schedule of Topics

This schedule is tentative. Homework is due every Thursday before class. If you miss class, you must still make sure that your assignment is submitted to Moodle by 1:10pm EST on the same Thursday. Electronic copies are required - consult the course website links for sample writeups and LaTeX template. Any assignments missing by the 1:10pm deadline will not be accepted. Students should expect at least 10 hours of work each week.

Week 1. Introduction
- Reading: Chapters 1 and 2
- Homework 1

Week 2. Basics of Algorithms Analysis, Graphs
- Reading: Chapters 2 and 3
- Homework 2

Week 3. Greedy Algorithms
- Project assigned
- Reading: Chapter 4
- Homework 3

Week 4. Greedy Algorithms and Divide and Conquer
- Reading: Chapters 4 and 5
- Homework 4

Week 5. Divide and Conquer
- Reading: Chapter 5
- Homework 5
- Project checkpoint 1

Week 6. Midterm
- Review
- Midterm

Week 7. Dynamic Programming
- Reading: Chapter 6
- Homework 6 (due the following Thursday)
- Project checkpoint 2

Week 8. DP and Network Flow
- Reading: Chapter 7
• Homework 7

Week 9. Network Flow
• Reading: Chapter 7
• Homework 8

Week 10. Intractability, Reductions, NP-Complete
• Reading: Chapter 8
• Homework 9

Week 11. Project
• Project presentations
• Project due

Week 12. Approximation Algorithms
• Reading: Chapter 11.1 - 11.5
• Thanksgiving!

Week 13. Approximation Algorithms
• Homework 10
• Reading: Chapter 11.6 - 11.8

Week 14. Randomized Algorithms and Review
• Reading: Chapter 13

Week 15. Final exam week

Total grade breakdown
Grades will be awarded based on the number of points earned and according to the percentage breakdowns shown.

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>25%</td>
</tr>
<tr>
<td>Group Project</td>
<td>15%</td>
</tr>
<tr>
<td>Midterm</td>
<td>25%</td>
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<tr>
<td>Final exam</td>
<td>35%</td>
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</tbody>
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Late work policy
All extensions must be requested at least 24 hours in advance of the deadline. Extensions will be granted based on individual circumstances. Work handed in late without a previously granted extension may not be accepted.
Attendance and Participation

Attendance at, and active participation in, all class sessions is expected of all students. Participation will be taken into account in awarding of final grades for students who are “on the edge” between two grades. For example, a student with a B+/A- average and a strong attendance and participation record would receive an A-, while a student with a weak record would receive a B+.

Collaboration

It is your responsibility to understand and follow the collaboration policy in this class. The goal of the policy is to encourage collaboration while ensuring that you and your classmates really engage in earning how to solve the challenging problems you’ll see in this course. If you are ever uncertain if collaboration or certain sources are allowed, you should ask the professor.

You are encouraged to discuss the lecture material and the labs and problems with other students, subject to the following restriction: the only “product” of your discussion should be your memory/understanding of it - you may not write up solutions together, or exchange written work or computer files. The group project is the only exception to this - in this case, these collaboration rules apply to students outside of your group and you may freely work closely with students within your group. Collaboration is not allowed on examinations or quizzes.

You should not use outside sources (the internet, other textbooks, students not in this class, etc.). Code should not be copied without permission from the author. If permission is given, code should be cited at the location it is used with a comment. If your solution is inspired by any outside resources (I understand that sometimes it is hard to not see things), you MUST cite.

Learning Accommodations

Students requesting accommodations in this course because of the impact of disability are encouraged to meet with me privately early in the semester with a verification letter. Students not yet approved to receive accommodations should also contact Deb Alder, Coordinator of Accessibility Services, at 610-526-7351 in Guild Hall, as soon as possible, to verify their eligibility for reasonable accommodations. Early contact will help avoid unnecessary inconvenience and delays.