

# Advanced Algorithms

## CS630

### *Syllabus*

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#### Instructor

Michael Jarret, Exploratory Hall 2220 (EXPL 2220), [mjarretb@gmu.edu](mailto:mjarretb@gmu.edu)

#### Teaching Assistant

Hao Yan, [hyan5@gmu.edu](mailto:hyan5@gmu.edu)

#### Office Hours

- Tuesdays 7:10pm - 8:30pm (or until no students remain)
- If you knock on my office door and I'm there
- By appointment

**Note:** My office is located in EXPL 2220, within the 2200 suite of offices. These offices bear the logo of "Geography and Geoinformation Sciences," although I am not a part of that department. The location can be a bit confusing, so feel free to reach out if you have trouble finding it.

#### Course Details

**Meeting Time:** 4:30pm - 7:10pm

**Days:** Tuesday

**Location:** Art and Design Building 2003

#### Course Description

Provides an overview of advanced algorithm design and analysis techniques. Topics include algorithms for hash tables, matrix operations, number theory, string matching, computational geometry, combinatorial optimization, and linear programming; also the areas of NP-completeness and approximation algorithms.

#### Textbooks

**Primary Text:**

- Algorithm Design, by Jon Kleinberg and Eva Tardos, 2006..

## Prerequisites

- CS 583 with a B or better

## Tentative Course Outline

*Note: The following course outline is tentative and subject to change based on the needs of the class.*

Week	Topic	Unit
1	Introduction and Review	-
2	FFT	1
3-4	Flow	2
5-7	Selected Complexity Classes	2
8-9	Approximation	3
10	Local Search	4
11-12	Randomization	4
13-14	Student Projects	5

## Grading Policy

The course is structured around five distinct units, each associated with a corresponding homework assignment. The overall performance in the course is evaluated based on these five homework assignments and a cumulative final exam.

### Homework Assignments:

- Each homework assignment corresponds to one of the five units covered in the course.
- Assignments are graded on a Pass/Incomplete (P/I) basis.
- A "Pass" (P) is awarded for scores of 80% or higher.
- An "Incomplete" (I) can be converted to a "Pass" through additional oral assessments or redoing the assignment. The procedure for this will be discussed on the first day of class.

### Course grade

The course grade is determined by the number of units passed and the overall grade on the final exam, as detailed in the table below. The final exam cannot negatively impact the student's course grade.

Units Passed	Final Exam	Course Grade
5	A+	A+
5	A	A
5	A- or below	A-
4	A- or above	B+
4	B+ or below	B
3	B or above	B-
3	B- or below	C
2 or fewer	Any grade	F

### Final Exam:

- The final exam is take-home, covering four units and excluding the project.
- It offers an opportunity to convert "Incomplete" grades in homework to "Pass" if the student scores 80% or better on the relevant unit in the final exam.

The exam is graded as follows:

Units Passed on Final	Overall Final Exam Average	Final Exam Grade
4	$\geq 95$	A+
4	[90, 95)	A
3	[80, 90)	A-
3	[70, 79)	B+
2	[60, 69)	B
2	[40, 60)	B-
$\leq 2$	$< 45$	0

*Note:* Grades on the final exam that are unlisted will not positively impact the student's average.

- **Clear Incompletes:** If students have any Incomplete (I) grades in units at the time of the undergraduate final exam, they have the option to take the relevant sections of the undergraduate final exam. This is to provide an opportunity to convert the 'I' into a 'Pass' (P).

These guidelines are designed to ensure that graduate students engage deeply with the course material through a combination of unit assessments and a comprehensive term-long project.

## Policies and Procedures

**Submitting Assignments:** Upload to Canvas.

**Contesting Grades:** Requests for regrades within one week of return.

**Collaboration:** Encouraged, but submissions must be individual work.

**Attendance:** Not used as part of grade calculation, but important information may be provided.

**Academic Honesty:** Adherence to GMU Honor Code is expected.

## Additional Information

### Communication Policy

All communication regarding this course should be sent to my email: [mjarretb@gmu.edu](mailto:mjarretb@gmu.edu). Please use the subject line "CS630 Inquiry: [Your Topic]" for all course-related emails. This will help me organize and respond to your emails more efficiently.

**I endeavor to respond to emails within 48 hours. However, if you do not receive a response within this timeframe, please send a follow-up email. For urgent matters, I strongly recommend attending my office hours rather than relying on email communication.**

### Regrade Policy

**Regrade Requests:** If you believe there has been an error in grading, you may request a regrade. Please note the following important points about our regrade policy:

- When a regrade is requested, the entire problem or assignment will be regraded from scratch.
- As a result of the regrade, the score for the problem can either increase, decrease, or remain the same.
- The new score obtained after the regrade will replace the original score, regardless of whether it is higher or lower.
- To request a regrade, you must provide a clear explanation of why you believe the original grading was incorrect.
- Regrade requests must be submitted within one week of receiving the graded assignment.

This policy is in place to ensure fairness and consistency in grading. It is important to carefully consider your request, as the regrade could result in a lower score.

### Academic Integrity

In this course, we uphold the highest standards of academic integrity. As a Mason student, you are expected to adhere to the University's standards of conduct regarding academic honesty. Collaboration is encouraged, especially for group assignments, but it is crucial that all work submitted is your own. You may work with peers on assignments, but the final submission must be authored individually. When collaborating, you must cite your collaborators, but solutions should not be identical to those of any other student. While similar mathematical solutions may arise, the accompanying explanations should be unique to each student, reflecting personal understanding. This ensures accurate assessment of each student's comprehension of the material. Violations of these principles will be addressed in accordance with the [Mason Honor Code](#).

## Disability Statement

Disability Services at George Mason University is committed to upholding the letter and spirit of the laws that ensure equal treatment of people with disabilities. Under the administration of University Life, Disability Services implements and coordinates reasonable accommodations and disability-related services that afford equal access to university programs and activities. Students can begin the registration process with Disability Services at any time during their enrollment at George Mason University. If you are seeking accommodations, please visit [ds.gmu.edu](https://ds.gmu.edu) for detailed information about the Disability Services registration process. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email: [ods@gmu.edu](mailto:ods@gmu.edu) | Phone: (703) 993-2474

## Diversity Statement

In this course, and across George Mason University, we are committed to creating an inclusive environment where diversity is recognized and valued. This includes but is not limited to diversity in race, ethnicity, culture, social class, gender identity and expression, sexual orientation, physical ability, age, and religious beliefs. We believe that diversity enriches the educational experience, promotes personal growth and a healthy society, and strengthens communities and the workplace. Our commitment to diversity also involves addressing and confronting issues of discrimination, inequality, and injustice. We are dedicated to supporting all students, and to upholding the principles of equity and inclusivity in our classroom and our community. For more information, please refer to the [Mason Diversity Statement](#) and the [Mason Non-Discrimination Policy](#).