Spring 2023 COT 3100H Project Timeline

Day, Date	What's Due	Points
Wednesday, March 29	Project Proposal, Sources	10
Friday, April 14	Project Checkpoint	15
Friday, April 28	Project Submitted on Webcourses	75

Project Proposal

This should be a one or two page document which explains the topic you have chosen for your method, your goals in exploring this topic, a list of at least three sources you intend on using for your final paper, and descriptions of any experimentation you intend on carrying out or code you plan to write. The sources should simply be listed at the end of the document.

Check Point

You'll be asked to turn in any materials that show that you've progressed on your final project. There will be no restriction on the file types for submission, so you can scan in drawings, turn in a partial paper, show code sketches or segments, whatever you want to do to prove to me that you've made progress on your project.

Final Project Submission

The main part of the paper should be written in English and look like a typical research paper. This should be a .pdf file. (If you do it in Word, just save to pdf.) If you write some code or have other data to share, please share with me in a format that I'll be able to see easily (for code please give me either .cpp, .c, .java or .py files, ask me if you have something else you'd like to share and I'll let you know what file formats are permissible.)

Note: All submissions will be made via Webcourses by the dates stated above.

Sample Project Ideas

The final project should be an **individual** exploration into a discrete math related or adjacent topic that is beyond the syllabus of the course. Below are some possible topic ideas.

Probability Topics

Taking a game, such as Monopoly, Risk, or any card game, and analyzing the probabilities involved in the game. In addition to this analysis, a simulation can be written to see if the experimental results coincide with the theoretical findings.
Markov Chains

Counting Topics/Special Numbers

Catalan Numbers
Derangements
Stirling Numbers
Bernoulli Numbers

Other Topics

Summation techniques not taught in class
Recurrence relations
Game Theory, Game of NIM
Generating Functions

Number Theory

Probabilistic Algorithms - Primality Testing (Miller-Rabin Algorithm)
Chinese Remainder Theorem and Applications
Properties of the Euler-phi function
Brief introduction into group theory
RSA encryption, or another encryption technique that uses discrete mathematics
Quadratic Reciprocity

Linear Algebra

Introduction to Linear Algebra
Basics of Linear Algebra as related to image processing
Network Flow and relationship to linear algebra

Specific Problem Idea

Take a harder problem (maybe an AIME problem), solve it a couple different ways, and or generalize the problem and write a computer program to solve it as well

Anything else you can think of!