CSC-395: Network and Matrix Computations, Syllabus Fall 2020

Instructor Information
- Nicole Eikmeier, Assistant Professor of Computer Science
- She/Her Pronouns
- Preferred name: Professor Eikmeier
- Email: eikmeier@grinnell.edu
- Office Hours: Book online at calendly.com/eikmeier
  TBD based on student availability

Course Information
- Number: CSC-395-01
- Title: Network and Matrix Computations
- Pre-Requisites: CSC-207, MAT-215
- Class Meetings: Tuesday and Friday 1-2:50 pm

Course Overview and Goals
This course will be a dive into network (graph) analysis. We will explore the relationship between problems stated on networks and their solutions. A key component of this class will be in understanding the interplay between solutions written on paper, and their execution via matrix computations on a computer. The ultimate goal of the course is for you to become a network scientist, by designing and implementing your own research project.

Learning Outcomes (LO)
Upon Completion of this Course, students will be able to:
1. develop an experiment, model, or algorithm which expands upon fundamental Network Science techniques learned in the course.
2. relate the role of racism in Network Science (and technology more broadly) to the consequences of this inequity.
3. gather, interpret, and evaluate evidence, and incorporate it into writing.
4. describe an advanced Network Science topic of your choosing to your peers.
5. compose novel code in Julia for the purpose of network or matrix computations.
6. solve problems in the domain of network science.
7. create course goals in harmony with abilities, interests, and beliefs.
8. prioritize time effectively to meet individual, team, and course goals.

Class Requirements

Project – 50% of final grade (Assessment of LO 1, 3, 4, 5, 7, 8)
The project will be completed individually or in teams of 2. This is an opportunity for you to deeply explore a topic that you find interesting! When choosing a topic, the two main requirements are that your project involves network science, and that it has a significant computational component. I will be happy to discuss project ideas at any point.
There will be three main graded components to the project: the proposal, the research report of 6-12 pages, and a short presentation to your peers.

Problem Sets – 20% of final grade (Assessment of LO 5, 6)
There will be a few problem-sets which are meant to get you start thinking deeply about network science, and practice programming. Collaboration is allowed, but you must write up your solution individually. Acknowledge anyone you worked with in your submission. Submitted solutions will be graded for logical correctness, and clarity of the solution and arguments.

Essay – 10% of final grade (Assessment of LO 2, 3)
As computer scientists, and as Grinnell scholars, it is critical to examine the role of racism in your chosen field. In this written assignment you will be asked to think deeply about the role of Network Science and Technology more broadly in society, and the potential for harm. This assignment will be graded primarily on the depth of your thoughts, and secondly on the grammar and clarity.

Journaling– 20% of final grade (Assessment of LO 3, 6, 7, 8)
Throughout the course of the semester I will ask you take notes in a Journal (I will provide an electronic template), and additionally to reflect on your goals and your learning thus far. Your journal should be completed individually, and will be graded for completion.

Letter Grades
Letter grades for the entire course will be assigned as follows in the table below. I reserve the right to adjust the percentages in order to be more lenient.

Letter Grade	Percent		
A	93.0% and higher	C+	77.0% - 79.99%
A-	90.0% - 92.99%	C	70.0% - 76.99%
B+	87.0% - 89.99%	D	60.0% - 69.99%
B	83.0% - 86.99%	F	59.99% and lower
B-	80.0% - 82.99%		

Course Schedule

	Date	Topic	Reading	Assignment(s) Due
1	8/31	Introduction to Network Science	NA: 2.1-2.2, 3.1-3.5	Intro Survey Journal 1 Problem Set 1
2	9/7	Computational Network Science	NA: 11.1-11.7	Journal 2 Problem Set 2
3	9/14	Choosing Your Project	NA: 13.1 *Two-mode network modeling and analysis of dengue* … by Malik et al	Journal 3 Problem Set 3 Survey on Project Interests
4	9/21	Becoming a Network Scientist	*Small-World Propensity and Weighted Brain Networks* … by Muldoon et al	Journal 4 Project Proposal
5	9/28	Advanced Network Science Ideas		Problem Set 4
6	10/5	The Problem with Network Science	*Algorithms of Oppression*, by Safyia Noble, Ch1 A Society Searching	Journal 5 Essay
7	10/12	Bringing it All Together		Project Presentation
8	10/19	Finals Week		Project Report & Code Journal 6

Course Materials

Required Textbooks & Materials (Note: All of these texts are available for free from our library, you do not need to purchase them.)

- *Network Analysis: Methodological Foundations (NA)*
- *Algorithms of Oppression: How Search Engines Reinforce Racism,* Safiya Noble
- *Two-mode network modeling and analysis of dengue epidemic behavior in Gombak, Malaysia,* Malik et al

Technology (Note: Please contact me as soon as possible if you do not have these items already.)

- A computer. This course has a computational component which means you will be coding. Ideally you would have a computer (or laptop) which you can access up to 24 hours each week (3-5 hours each day).
- Reliable access to Internet. All course materials will be posted online.
- Webcam & Microphone – the ones built into your computer will work just fine.
- Headphones - optional. Useful during video chats to prevent audio feedback and to not disturb those in your vicinity.

Resources

- Access our course materials: PWeb (https://pioneerweb.grinnell.edu)
- Databases, journal articles, and more: Grinnell Library (https://www.grinnell.edu/academics/libraries)
- Receive Assistance with strengthening your writing: Grinnell Writing Lab (https://www.grinnell.edu/academics/centers-programs-and-resources/writing-lab)
- Health and Wellness: SHAW (https://www.grinnell.edu/about/offices-services/student-health)

Course & College Policies

Attendance
I highly encourage you to attend all synchronously scheduled sessions, assuming that you are in a time zone which permits this. While they are not required, this portion of the class will be our main opportunity to build community with each other. I will focus synchronous sessions towards activities and discussion; they will not be lectures. Please let me know if you are in a time zone which prevents you from attending our synchronous sessions.

Late Policy
All assignments are to be turned in electronically by 11:59PM Central Time on the day they are due (in most cases, the Saturday of the week they were assigned). Due to the exceptional nature of this semester I will attempt to be as flexible as possible in accepting late work. I am aware that there are a number of things outside of your control that may affect your ability to complete work on time. If possible, please let me know if you plan to turn in work late. Assignments turned in more than two days late, without prior approval of the instructor will result in a grade no higher than a B. Please refer to the Student Workload statement below, to emphasize that you should attempt to follow the posted deadlines.

Incomplete Grade Policy
All work for the course is due by 5:00 pm on the last day of finals (10/21/2020). In exceptional circumstances, incomplete grades can be granted. Talk with me if you think you might need an incomplete to complete all the requirements of the course.

Student Workload
You can expect to spend 22 hours per week on this course, including all in-class and out of class time. This number is based off of the Grinnell Guidelines for credit-hours, accounting for our "double speed" this semester. *This is a significant amount of time!!* I would not expect you to be able to complete things last minute, so we will work together on planning and organization.

Academic Honesty Statement
Grinnell College's Academic Honesty policy is located in the online Student Handbook. It is the College's expectation that students be aware of and meet the expectations expressed in this policy. In addition, in this course, it is my expectation that students may collaborate on the project and on problem sets, however your collaboration must be attributed. Further,

except for a group final project, *all work must be written up independently*. If you have questions about how a particular assignment relates to the College's policy, or how to attribute your collaboration, I will gladly consult with you in advance of the assignment's due date.

Religious Observance
I encourage students who plan to observe holy days that coincide with class meetings or assignment due dates to consult with me in the first two weeks of classes so that we may reach a mutual understanding of how you can meet the terms of your religious observance and also the requirements for this course.

Students with Disabilities
I encourage students with documented disabilities, including invisible disabilities such as chronic illness, learning disabilities, and psychiatric disabilities, to discuss appropriate accommodations with me. You will also need to have a conversation about and provide documentation of your disability to the Coordinator for Disability Resources, John Hirschman, 641-269-3089.

Technology Usage Policy
Materials you have obtained from this course including lecture videos and problem sets should not be distributed outside of the members of our class. Live synchronous sessions should not be recorded by students. I may record and distribute our synchronous sessions, depending on student feedback. During synchronous sessions, I encourage you to turn on your video in order to help us build a sense of community. If you have reasons not to turn on your video, I will gladly make an exception. Finally, an online course requires all of us to be generous and supportive. Be extra thoughtful in our online spaces with the words that you choose.

Inclusion Statement
It is my intention that students from all backgrounds and perspectives will be well served by this course, and that the diversity that students bring to this class will be viewed as an asset. I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, socioeconomic background, family education level, ability – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class. Your suggestions are encouraged and appreciated.

Take care of yourself.
Do your best to maintain a healthy lifestyle this term by eating well, exercising, avoiding drugs and alcohol, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress.

All of us benefit from support during times of struggle. You are not alone. There are many helpful resources available through campus and an important part of the college experience is learning how to ask for help. Asking for support sooner rather than later is often helpful.

If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, we strongly encourage you to seek support. Student Health and Wellness (SHAW) is here to help: call 641-269-3230 and visit their website at https://www.grinnell.edu/about/offices-services/student-health. Consider reaching out to a friend, faculty or family member you trust for help getting connected to the support that can help.

If you or someone you know is feeling suicidal or in danger of self-harm, call someone immediately, day or night:

- Need to Talk Line: 641-269-4404 (available 24/7 for counseling needs)
- 24/7 Suicidal Hotline: 1-800-273-8255
- **If the situation is life threatening, call 911**

Acknowledgements