CDS 411 Syllabus

Version 3

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Fall 2021

1 Vitals

- Course: CDS 411 - Modeling and Simulation 2
- Instructor: J. M. Kinser, D.Sc.
- Meeting Time: Tuesday 4:30 - 7:10
- On-campus location Innovation Hall 328
- Contact: Course questions will be submitted through the Blackboard website: Personal issues should be emailed to jkinser@gmu.edu
- Phone Number: 703 993 3785
- Computer Language: Anaconda Python 3.6 or newer

2 Hardware

For this class you will need:

- A computer.
- Internet access sufficient to participate in a Zoom meeting and to view recorded videos.
- The ability to record a video (audio and video) of you discussing a topic.
- The ability to have an online meeting (Zoom, MS-Teams, etc.). This applies to on-campus students as well, since they may need to meet with online students.

3 Course Management

This course will be presented in a flipped format. Which means:

1. You will watch the lecture videos before class and come to class prepared to discuss and use the content therein.
2. Class time will consist of:
    - Questions and discussion,

- In-class examples,
- Project progress reports, and
- Graded assignments.

3.1 Software

- Students will need to install Anaconda Python 3.6 or newer.
- Students will need to make videos. This can be in the form of recorded Zoom session or the generation of an MP4 movie. Optional (and free) software that might assist include LibreOffice, GoogleSheets, Audacity and KDenLive.
- We will use Blackboard as the course repository and main communications.

3.2 Course Modules

This course will be delivered as 5 multi-week modules, each one having an overall theme and multiple assignments. These are:

1. Random Numbers and Probabilities,
2. Hidden Markov Models,
3. Graph Theory,
4. Kinematics and Mathematics, and
5. Chess.

Each module has several subtopics which are listed in the schedule.

3.3 Projects

Instead of a Midterm and Final, this course will rely heavily on team projects.

- Each team will consist of 3 people. If the number of students is not divisible by 3 then one group will have a different number. I will assign the groups, and each project will have a different arrangement of groups.
- Each report will be delivered as a 5 minute video saved as an MP4 format. Blackboard offers Kaltura which can be use to create and edit videos. In the past, some teams just record a Zoom session.
- I did mention that the videos should be about 5 minutes. Significantly longer videos will have points taken off for not following the rules.
- Grading portals. There will be two Blackboard portals used for the projects. The first is a portal on the Discussion board. Each team will upload one video. Anyone in the class can watch these videos. The Discussion board will also be used for the Q&A portion of the project. The second portal will be the Assignment page. The only thing that you put here is a note telling me that you've uploaded the video to the Discussion board. This will trigger Blackboard to tell me that you have an assignment pending grading.
- Since these videos will have student faces and voices, we CAN NOT post them on public sites such as Youtube. They can be posted **only** on Blackboard.

- A single grade will be given to all members of the group.[1]
- Each person in the group will be assigned a responsibility: Theory, Approach used in the Answer, Results and interpretation thereof. Each student will be responsible for presenting their portion of the report. The person responsible for Theory will not present the Approach or Results section.
- The team will submit a MP4 and their Python code as Jupyter files. All students will be able to view all videos through Blackboard. This course will not post any video on a public source (YouTube) as that violates FERPA regulations.
- (But wait - there's more): Each student will be required to ask one question for each presentation from the other groups. The individuals will receive grades for asking appropriate (and non-trivial) questions. The individual will receive points for appropriately answering these questions.

Grading rubric for Projects:

[1] Welcome to Reality. The work environment is much like this.

Item	Points	Excellence	Good	Fair	Fail
Deadline	10	On time	24 hours late	36 hours late	Not turned in
Theory	10	Fully understood and articulated	Knowledgeable and presented OK	Faults in understanding	Lost in space
Approach	10	Completed project	Got most of it right	Got some of it right	Lost in space
Coding	10	Efficient Python code	Working Python code but some inefficiencies	Spaghetti code	No code turned in.
Results	10	Accurate results	Mostly accurate results	Got some numbers from the computer and they are cool	No results
Replication	10	I can run your codes without modifications	I had to make some tweaks to get it to run	Problems in many places	What is this garbage?
Analysis	10	Full comprehension and interpretation of results	Mostly understood results but less so on interpretation	Understood some of the results	Clueless
Content Presentation	10	Quite clear. I learned something from you	Mostly clear	There's good stuff in there somewhere	Lost
Video Quality	10	I could read all print and hear all words	Occasional drop in quality	Some parts are just not understandable	Garbage in - bad grade out.
Answers	10	Intelligent answers to questions	Good answers	Wrong answers	Did not answer

4 Course Delivery

This course will be *flipped*. This means that students will watch lecture videos before coming to class. During class time we will work on programming skills which will include homework and projects. Students are expected to have watched the videos before class, and the instructor may have a pop quiz at the beginning of any class to confirm compliance.

The textbook will be provide by the instructor. Many of the Python codes used in the book will be provided.

4.1 Homework

Homework will be traditional. You will have 7 days to finish each assignment.

You may communicate with other students concerning concepts of the homework. You can say, "I solved it by using this theory." You can not say, "Here's my code and my answer. Use them freely."

Homework assignments will be graded on an individual basis.

A note on cheating. For some reason, there always seems to be a student who copies from the others. There is no place for cheating at Mason. My wrath will be unforgiving. If you are falling behind in the class, then contact me. I will be glad to help you catch up. Really.

5 Course Grade

The contributions to the grade will be:

- 50% projects
- 50% homework.

The scores from the projects and homework will be scaled and added. The following is the breakdown for the letter grade.

- A+: 97% of the available points.
- A: 93.3% of the available points.
- A-: 90.0% of the available points.
- B+: 86.7% of the available points.
- B: 83.3% of the available points.
- B-: 80.0% of the available points.
- C+: 77% of the available points.
- C: 73.3% of the available points.
- C-: 70.0% of the available points.
- D: 60.0% of the available points.
- F: Less than 60% of the available points.

6 Extra Credit

None.

7 Topics

- Week 1: Random values.
- Week 2: Monte Carlo method
- Week 3: Schelling's model and intro to Hidden Markov Models
- Week 4: Hidden Markov Models
- Week 5: Gene Expression array normalization
- Week 6: Connected graphs part 1
- Week 7: Connected graphs part 2
- Week 8: Simultaneous equations part 1
- Week 9: Simultaneous equations part 2
- Week 10: Kinematic motions
- Week 11: Oscillatory motion
- Week 12: Coupled differential equations
- Week 13: Massive decisions
- Week 14: Chess

8 Dealing with the Pandemic

8.1 Mask Policy

No one likes wearing these masks, but we are going to do it. Mason's policy is that all people will wear masks when indoors. Unvaccinated people will wear masks even when in an outdoor setting.

Masks are inconvenient and make it harder to communicate, but we will do whatever we can to safely meet in class.

Mason masks are available through the bookstore. Standard masks are available through the department.

I look forward to seeing all of you on the other side of this pandemic.

8.2 Illness

Students who are experiencing a longer term illness should contact the instructor as soon as possible. We will figure out the best way to see you through the semester. Accommodations are possible only if you contact me (or in serious cases - someone else contact me on your behalf) during the illness. Students who wait until December to say, "But I was sick back in October," have a much harder time getting accommodations for that illness.

8.3 Course Modality

This course has both on-campus and online components. Students who sign up for one modality will remain in that modality. Students wishing to change modality will need to register for the appropriate section of this course.

On-campus students who are ill will need to contact the instructor to arrange for making up the missed classes.

8.4 Being On Campus

One of the best tools Mason has to track and understand the behavior of the COVID virus is through Mason Covid Health Check (MCHC). This is a simple webpage interface that all people associated with Mason should fill out on a daily basis. It asks a few questions and then provides a color-coded response. Before stepping foot on campus, you should have a Green response. Other colors mean that you need to pay attention to your health.

All instructors and offices at Mason can request that you show a MCHC Green before entering a classroom or office. This policy applies to students, staff and faculty.

Please note, all students who come to campus are required to follow the university's public health and safety precautions and the procedures outlined on the university Safe Return to Campus webpage (`https://www2.gmu.edu/safe-return-campus`).

9 Assistance and Legalities

Below are just of few support services available to students. The full list is at: `https://stearnscenter.gmu.edu/knowledge-center/knowing-mason-students/student-support-resources-on-campus/`.

9.1 IT Support

If you are having difficulties with your Mason network account, or with software on the Mason network , please contact IT support: support@gmu.edu . Or pay them a visit in Innovation Hall: ITS Support Center, Innovation Hall, Room 226. You can also call them: 703-993-8870.

9.2 Academic Integrity

It is expected that students adhere to the George Mason University Honor Code as it relates to integrity regarding coursework and grades. The Honor Code reads as follows: "To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of the George Mason University community and with the desire for greater academic and personal achievement, we, the student members of the University Community have set forth this: Student members of the George Mason University community pledge not to cheat, plagiarize, steal and/or lie in matters related to academic work." More information about the Honor Code, including definitions of cheating, lying, and plagiarism, can be found at the Office of Academic Integrity website at `http://oai.gmu.edu/honor-code/`.

9.3 Accommodations

If you are a student with a disability and you need academic accommodations, please contact Disability Services (DS) at 703-993-2474. All academic accommodations must be arranged through DS.

9.4 Digital Communication

Privacy is important for faculty and student communications. Students are required to use their Mason email when communicating their instructors. Instructors, being employees of the State of Virginia, are required to use their Mason email when communicating with students.

9.5 Freedom

This course will encourage students to respectfully present their thoughts. At Mason, we have a wonderful diversity of students providing a rich resource of education, thoughts, and growth. Through this unique Mason community, we can learn more about ourselves and our world then we could in almost every other university.

https://www2.gmu.edu/1stAmendment

9.6 Respect for Diversity

Mason is a great example of a diverse society, where students and faculty can embrace the knowledge and relationships gained from being in an academic environment with people from a large variety of countries, backgrounds, experiences, heritages, and so on. All students are expected to respect people within this diverse population, and they could greatly benefit from its riches by immersing in the Mason experience. Disrespect will not be tolerated in this class.

9.7 Title IX

Notice of Mandatory Reporting of Sexual Assault, Interpersonal Violence and Stalking: As a faculty member, I am designated as a "Responsible Employee," and must report all disclosures of sexual assault, interpersonal violence and stalking to Mason's Title IX Coordinator per University Policy 1412. If you wish to speak with someone confidentially, please contact one of Mason's confidential resources, such as the Student Support and Advocacy Center (SSAC) at 703- 380-1434 or Counseling and Psychology Services (CAPS) at 703-993-2380. You may also seek assistance from Mason's Title IX Coordinator by calling 703-993-8730 or emailing cde@gmu.edu