Syllabus

M4320-010–Mathematical Modeling Fall 2017 Tarleton State Univ Dr. Scott Cook

Sec (010):	Math Bldg 304, TR 3:05-4:20PM	**My Office**:	Math Bldg 132 (254)968-1958
Instructor:	Dr. Scott Cook	**Office Hours**:	TWR 1:00-3:00 or by appointment
My Email:	scook@tarleton.edu	**Math Clinic**:	Math Bldg 203
Math Dept Office:	Math Bldg 142 (254)968-9168	**Math Clinic Hours**:	MTWR 8:00-5:00, F 8:00-2:00

Materials:

- Required: *Introduction to the Modeling and Analysis of Complex Systems* by Hiroki Sayama, ISBN: 978-1-942-34108-6. Available for purchase through SUNY Open Textbooks and for **FREE** at https://textbooks.opensuny.org/introduction-to-the-modeling-and-analysis-of-complex-systems
  I just discovered this book and am very excited to use it because
  1) It tightly integrates computer simulation via Python (Jupyter notebooks).
  2) It covers a wide selection of great topics with cool applications.
  3) It is free.
- Suggested: *Introduction to Scientific and Mathematical Computing* by Adam Cunningham www.acsu.buffalo.edu/ adamcunn/spring2017/_downloads/MTH337ClassnotesSpring2017.pdf

Course Content: Chapters 1-9 - Discrete-time dynamical system models, continuous-time dynamical system models, long-term behavior and stability, bifurcations, chaos. Depending upon class interest, we may add/substitute topics from ch 10-19 such as interactive simulations, cellular automata, fields networks, or agent-based models. We may also add/substitute stochastic models such as Markov chains.

Homework: Homework will be assigned roughly once per week, typically due 1 week later.

Collaboration: You are encouraged to collaborate, especially when debugging code. But, you must fully understand the final product and be able to reproduce it yourself. The exams may ask you to handwrite code - the homework is where you practice to do it. Moreover, many problems will involve both code AND written explanations of the methods/results. You must write your own unique explanations AND CITE your classmates that helped with the code.

Quizzes: I do not plan to give in class quizzes, though I may implement them mid-semester if necessary. In this case, the grade weights given below may adjust.

Technology: Python simulation will be tightly integrated throughout this course. Please install the Anaconda distribution and/or create an account at cocalc.com.

Project: You will do a capstone project using techniques from the course. This is due on the last day of lecture. You must start it early in the semester because you will almost certainly encounter coding challenges. You may even need to change topics if the obstacle is tough enough. You must have the work done at least 2 weeks in before the due date to leave yourself time to write it up clearly. More details later.

Exams: There will be one midterm exam and a comprehensive final exam. Tentative dates (subject to change):

- Mid Term - Thursday, October 19, in class
- Final Exam - Saturday, December 9, 11:30-2:00

Attendance Policy: Attendance is mandatory for success. This course builds upon itself; each absence undermines your understanding (and your grade) for the rest of the course. Like most things necessary for success in life, you don't get direct credit for it ... it's just something you must do in order to succeed.

Makeup Policy: No late homework, makeup quizzes, or makeup exams without a **documented** university recognized reason listed below. However, I will drop the lowest 2 homework/quiz scores.

Illness Death in the immediate family Legal proceedings Participation in sponsored University activities

Grading Policy: The guaranteed grade cutoffs are listed below. At my sole discretion, I may curve the course by relaxing them at the end of the semester.

Homework	40%
Project	25%
Midterm Exam	10%
Final exam	25%

A	[90%, 100%]
B	[80%, 90%)
C	[70%, 80%)
D	[60%, 70%)
F	[0%, 60%)

Notes

- In the event that the university is closed for a scheduled class time, you should assume that whatever was scheduled/due on that day will be scheduled/due on the next class meeting.
- You are expected to present a valid TSU ID upon request.
- Aside from university and departmental policy, all aspects of course policy are at the discretion of the instructor and subject to change.

Tips For Success

Sources of help:

- The Math Clinic (math 203). Specifically, Wesley Pryor (masters student) has been hired to help with Python. He will be in the clinic TR 10:00-12:30.
- My office hours (math 132). See hours at top of syllabus.
- Classmates
- Textbook
- Lecture notes
- Internet (stackoverflow is great)

Your job and my job: By registering for this course, you declared to the world "I am going to learn Math Modeling." Great!! I can help. I have books, lectures, assignments, etc that will help you accomplish your mission. I consider it a privilege to help you learn this subject and I'll do everything I can to help you.

But it is **YOUR RESPONSIBILITY** to learn this stuff. Some students think it's the teacher's job to force the knowledge into your head. It's not - that's your job. I'm just here to help and then report to the world about how successful you were via your grade.

Time Management: Start early and plan to work in several short bursts. Don't expect to do it in one sitting.

Why? Your brain works on problems while you are doing other things. It's "free" work. You want to maximize this "free" work. You will learn better, spend less time, and have less stress. In contrast, if procrastinate and try to do it all in one sitting, you get no "free" work. You don't learn as well, will do poorly on the exam, and you feel more stress. This is the least efficient approach.

Here's your plan: Start the assignment immediately after it posts. Work until you get stuck or are moving slowly. Go do something else. Your brain keeps working. Try again later - you may not be stuck anymore. Repeat frequently.

Get the Most From Lecture:

1) Read the section before lecture. You may not understand it, but it'll prepare you to learn better during lecture.

2) Engage in lecture by listening closely, taking notes, asking questions, catching my errors (yes, I make errors), and responding to my questions. If you get lost, DON'T PANIC. Carefully write down the rest of the lecture to review later.

3) Review your notes after lecture, making sure that you understand everything this time. If not, look at the book and discuss with classmates or me.

4) Apply what you learned to the homework problems.

University Master Syllabus

http://catalog.tarleton.edu/syllabus

Catalog Description: An advanced course in mathematical modeling requiring students to build and validate deterministic models of complex phenomena. The course will emphasize both qualitative and quantitative computational techniques of applied mathematics.

Student Learning Objectives:

Knowledge Outcomes:

1) Demonstrate an ability to identify a problem, make assumptions and collect data (if necessary), develop a model, test the assumptions, refine the model as appropriate, fit the model to data (if appropriate), and analyze the model structure to assess the sensitivity of the model.
2) Demonstrate an ability to utilize mathematical background and available technology to enhance the model construction, research, and analysis processes.
3) Develop an appreciation for the significance of communicating results and analysis in a clear, organized fashion.

University Policy: Students are responsible for knowing and abiding by the policies and information contained in the Tarleton Student Handbook [TSUSH].

Student Responsibilities: The student is solely responsible for:

- Attending class.
- Completing every assignment by the specified due date.
- Utilizing, as needed, all available study-aid options (including meeting with the instructor, attending Supplemental Instruction (SI) sessions, going to the Math Clinic, using tutorial software, purchasing a student solutions manual, hiring a personal tutor, etc.) to resolve any questions that they might have regarding homework, course material, and/or technology projects.
- Reading all relevant material in the course text and lecture.
- Being present and prepared for each exam on the specified date and time, unless the instructor determines that a makeup exam is warranted (see Makeup Policy above).
- Obtaining assignments and other materials for classes from which they are absent.
- Giving as much effort as it takes to pass this course.

Student Success Statement - ADA: It is the policy of Tarleton State University to comply with the Americans with Disabilities Act and other applicable laws. If you are a student with a disability seeking accommodations for this course, please contact the Center for Access and Academic Testing, at 254.968.9400 or caat@tarleton.edu. The office is located in Math 201. More information can be found at www.tarleton.edu/caat or in the University Catalog.

Cell phones: Students are expected to set their cell phone so as to emit no audible noise in the classroom. Except for emergency situations, cell phone use (including texting) during the class period is prohibited. A student who is noticeably (to the instructor) distracted by his/her cell phone and/or distracting others with it may be asked to immediately disable it or to leave the classroom. To compensate for your electronic deprivation, keep your calculator on.

Absence Policy: Class absence policies will be established and enforced by each individual course instructor. The course instructor may recommend to the Dean of Students that a student be dropped from a course if excessive absences prevent satisfactory progress.

Makeup Policy: Each course instructor has the responsibility and authority to determine if work can be made-up because of absences. Students may request make-up considerations for valid and verifiable reasons such as the following:

- Illness
- Death in the immediate family
- Legal proceedings
- Participation in sponsored University activities (It is the responsibility of students who participate in University-sponsored activities to obtain a written explanation for their absence from the faculty/staff member who is responsible for the activity.)

Failing grades Tarleton differentiates between a failed grade in a class because a student never attended (F0 grade), stopped attending at some point in the semester (FX grade), or because the student did not pass the course (F) but attended the entire semester. These grades will be noted on the official transcript. Stopping or never attending class is considered an unofficial withdrawal and can result in the student having to return aid monies received. For more information see the Tarleton Financial Aid website.

Student Safety and Title IX: You are in college to achieve academic success, but you must feel safe and take care of yourself to reach your full potential. You have the right to pursue your education in a safe environment. Title IX makes it clear that violence and harassment based on sex and gender are civil rights offenses subject to accountability. *If you or someone you know has been harassed or assaulted, there is help and support on campus.* You may seek assistance confidentially through the Student Counseling Center or the Student Health Center. You may also make a report to the campus Title IX coordinator, which may trigger a university investigation (not a criminal investigation). Additionally, you may pursue criminal charges through the university police department. If the assault occurred away from campus, UPD can assist you in connecting with the appropriate law enforcement agency.

Student Counseling Center: 254-968-9044 (phone is answered 24 hours a day, 7 days a week), TSC 212

Student Health Services: 254-968-9271, TSC 212

Title IX Coordinator: 254-968-9754, Admin Annex 1, Room 112

University Police Department: 254-968-9002, located on the back side of Wisdom Gym

University Core Values

Academic Integrity Statement: Tarleton State University's core values are integrity, leadership, tradition, civility, excellence, and service. Central to these values is integrity, which is maintaining a high standard of personal and scholarly conduct. Academic integrity represents the choice to uphold ethical responsibility for one's learning within the academic community, regardless of audience or situation.

Academic Civility Statement: Students are expected to interact with professors and peers in a respectful manner that enhances the learning environment. Professors may require a student who deviates from this expectation to leave the face-to-face (or virtual) classroom learning environment for that particular class session (and potentially subsequent class sessions) for a specific amount of time. In addition, the professor might consider the university disciplinary process (for Academic Affairs/Student Life) for egregious or continued disruptive behavior.

Academic Excellence Statement: Tarleton holds high expectations for students to assume responsibility for their own individual learning. Students are also expected to achieve academic excellence by:

- honoring Tarleton's core values.
- upholding high standards of habit and behavior.
- maintaining excellence through class attendance and punctuality.
- preparing for active participation in all learning experiences.
- putting forth their best individual effort.
- continually improving as independent learners.
- engaging in extracurricular opportunities that encourage personal and academic growth.
- reflecting critically upon feedback and applying these lessons to meet future challenges.

Academic Honesty: Tarleton State University expects its students to maintain high standards of personal and scholarly conduct. Students guilty of academic dishonesty are subject to disciplinary action. Academic dishonesty includes, but is not limited to, cheating on an examination or other academic work, plagiarism, collusion, and the abuse of resource materials. The faculty member is responsible for initiating action for each case of academic dishonesty that occurs in his or her class.

Academic dishonesty includes, but is not limited to, cheating on an examination or other academic work, plagiarism, collusion, unauthorized use of technology and the abuse of resource materials.

1) Academic work means the preparation of an essay, thesis, problem, assignment or other projects submitted or completed for course credit and to meet other requirements for noncourse credit.
2) What constitutes an act of academic dishonesty may, in part, depend on the particular course and expectations of academic integrity in the context of the course objectives. This includes, but is not limited to, the following:
    2.1) Copying, without instructor authorization, from another student's test paper, laboratory report, other report, computer fi les, data listing and/or programs.
    2.2) Using, during a test, materials not authorized by the person giving the test.
    2.3) Collaborating with another person without instructor authorization during an examination or in preparing academic work.
    2.4) Knowingly and without instructor authorization, using, buying, selling, stealing, transporting, soliciting, copying, or possessing, in whole or in part, the contents of an unadministered test or other required assignment.
    2.5) Substituting for another student or permitting another person to substitute for oneself in taking an examination, preparing academic work, or attending class.
    2.6) Bribing another person to obtain an unadministered test or information about an unadministered test.
    2.7) Using technological equipment such as calculators, computers or other electronic aids in taking of tests or preparing academic work in ways not authorized by the instructor or the university.
3) Plagiarism means the appropriation of another's work and the unacknowledged incorporation of that work in one's own written work in any academic setting.
4) Collusion means the unauthorized collaboration with another person in preparing written work in any academic setting.
5) Abuse of resource materials means the mutilation, destruction, concealment, theft or alteration of materials provided.

This syllabus subject to change as deemed appropriate by the instructor.