

## 1 Guiding Questions

- What and who is this class for? What are its goals?
- How do we design the grading scheme? What types of assignments are appropriate? What specific skills do we expect them to get out of the class?
- How do you write/grade individual assessments? What does success mean?

## 2 Tips for Success

- Keep course objectives short and simple.
- Communicate with students on what to expect and why you are using these techniques.
- Keep your grading scheme simple and clear.
- Be as specific as possible about how grades are determined overall and on each assignment.
- Help students keep track of their grade.
- Keep language for grade assignments positive and tell students to expect that they will need to revise.
- Prepare students for the time management skills needed to handle multiple revisions on multiple assignments.
- Be ready to address student frustration when they have to retry multiple times.
- Build in boundaries to protect yourself and your time.

## 3 Excerpts from the Syllabus for MAT 4410

### 3.1 Course description:

Mathematical models provide a way of describing and understanding biological, physical, chemical, social, or economic systems quantitatively. They allow us to answer real world questions and predict future results relating to a physical system. Modeling is used extensively in almost every field of academia and industry. It is the goal of this course to explore the process of developing a mathematical model and learn techniques for analyzing the validity of the model as well as making conclusions about a real-life system from the model. While any area of math, if appropriate, can be used for a math model, we will focus primarily on ordinary differential equations, discrete-time dynamical systems, and networks. **The style of this course may feel different than your previous math classes. Since mathematical modeling is a process that requires hands on practice we will devote much of the time in the classroom to working in groups on problems. New mathematical techniques and concepts will primarily be introduced in the form of pre-class readings/videos. To get an understanding of what to expect please see the course structure section below.**

### 3.2 Course Objectives:

We will cover all aspects of the math modeling process. After successful completion of this class, given a real-world problem, you will be able to:

1. Formulate the problem as a mathematical question/problem
2. Apply the appropriate type of math to address the problem
3. Analyze and assess a model through various techniques
4. Understand how and when to use mathematical software during the modeling process
5. Update/improve a model as necessary
6. Communicate results orally and in writing (using LaTeX) to the appropriate audience
7. Collaborate with peers to solve a problem

### 3.3 Class Structure:

- **Before each class:** Read/watch the corresponding reading/video(s) marked on the Course Calendar. This will introduce you to the topics/ideas that will be further explored in class. Some videos will be accompanied by half-notes that will be filled in during the video. There may be introductory questions to answer that will serve as a starting point for our in class discussions/activities. Any half-notes (blank and filled versions) as well as questions will be posted on blackboard.
- **During class:** You will further explore that day's topic through group work with minimal lecture. We will also have time to answer any questions you may have from the pre-class reading/video(s). Some Fridays will have short Skills Quizzes.
- **After class:** You will have roughly-weekly Homework assignments that focus on "bigger picture" concepts related to activities from class. The initial due dates will be on most Wednesdays by 11:59pm. Due dates for everything are on the Course Calendar.

### 3.4 Assignments:

The way assignments are graded in the course will likely be different than many of your previous courses. The only assignment with set points will be your final project. For the skills quizzes and homework assignments you will be given a 'grade' of 'Success,' 'Retry,' or 'Incomplete'. The definition of these for each assignment is given below. You will need to receive a certain number of successes in each category to receive a certain letter grade. There is a table below giving more details on this grading scheme. You will also be provided with a spreadsheet to keep track of your progress throughout the semester.

#### 3.4.1 Skills Quizzes:

There will be in-class Skills Quizzes on most Fridays. **Modeling is not a course that lends itself to exams. The modeling process can be a long process which requires time for creativity and collaboration. However, there will be some new mathematical techniques you will learn along the way. Skills Quizzes serve the purpose to ensure that you are gaining proficiency in these new mathematical concepts. It takes time to work out new skills, therefore you will be able to attempt a particular Skill multiple**

**times during the semester to demonstrate proficiency in each skill.** You are required to attempt each Skill on the assigned day as listed in the course calendar unless you have extenuating circumstances that are communicated to me prior to the scheduled quiz time. As time allows you may be able to re-attempt a previous Skill during another Skills Quiz period in class or you may choose to re-attempt during office hours. Due to this retry process there is no partial credit on Skills Quizzes. **Success** for a skill means **all problems** for that skill are correct on any single Skills Quiz.

### 3.4.2 Homework:

There will be **11** Homeworks throughout the semester due most Wednesdays. Each Homework assignment is designed to tie together multiple concepts from class or build off an activity from class.

Each Homework will be marked **“Success,” “Retry,” or “Incomplete.”** Each Homework has “Criteria for Success” on it. Homeworks marked “Retry” will have ample constructive feedback intended to help you learn and grow, and you may revise each homework at most **2** times. To guarantee more timely feedback and to help prevent a mountain of redos for you at the end of the semester, **only 2 revision submissions per week are allowed.** “Incomplete” means not everything has been submitted or the submission is illegible so only minimal feedback can possibly be provided, but you may still revise and resubmit as with a Homework marked “Retry”. Blackboard will show a 1 for “Success” and 0 for “Retry” or “Incomplete.”

### 3.5 Grade Determination:

Your final grade for the course will be determined by the table below. The numbers in each row are the minimum number of “Successes” necessary to meet the requirement for the grade associated with that row. For example, earning a “B” requires at least 7 Skills deemed a success. To earn a grade, complete all requirements in the row for that grade. The numbers in parentheses indicate the maximum number of “Successes” possible for each type of assignment. The Final Project column corresponds to the points earned on the project instead of number of “Successes.”

Grade	Skills (9)	Homework ( <b>11</b> )	Final Project (100)
<b>A</b>	8	10	≥90
<b>B</b>	7	9	≥80
<b>C</b>	6	8	≥70
<b>D</b>	5	7	≥60

If not all of the requirements in the row for a “D” are met, that will result in an “F.”

#### Plus/minus grades:

- A plus is earned on a letter grade if all requirements for that grade are met and one requirement from the next grade up is met.
- A minus will be determined on a case-by-case basis, based on how close you are to meeting all requirements for a given grade.

There is a Grade Tracker on Blackboard in the “Grading Scheme” section to help you keep track of where you stand.

## MAT 4410 Grade Tracker

**Instructions:** Work from the bottom row upward as you progress in the semester. The checkboxes should work electronically if you'd rather not print this out. Check a box each time you have earned a "Success" in each category. For the Final Project, check all boxes that correspond to the score you receive.

Once all check boxes in a row are filled, you have earned at least that grade so far (barring the Final Project outcome).

Grade	Skills	Homework	Final Project
<b>A</b>			$\geq 90$
<b>B</b>			$\geq 80$
<b>C</b>			$\geq 70$
<b>D</b>			$\geq 60$

If not all of the requirements in the row for a "D" are met, that will result in an "F."

### Plus/minus grades:

- A plus is earned on a letter grade if all requirements for that grade are met and one requirement from the next grade up is met.
- A minus will be determined on a case-by-case basis, based on how close you are to meeting all requirements for a given grade.

In class you have been working on the lunch crunch problem, namely task one.

**Group Portion:** For task one write a rough draft of a report on your solution. You are welcome to use LaTeX or any other typesetting program. A link to a template for LaTeX on Overleaf is included on the assignment page. The rough draft should include:

1. Problem statement
2. Assumptions and justifications
3. List of variables (dependent and independent) along with any parameters necessary for your model.
4. Your solution explained in words with necessary equations included as it now stands (does not need to be completed)
5. List what questions you have remaining and summarize what is left to do to complete this task.

**Individual Portion:** Include a short explanation about what you contributed as an individual to the project, i.e. what section of the report did you write, what research did you do, etc. This may be included as a separate document to the submission or typed directly into blackboard.

**Criteria for success:**

- Problem statement is included and is well written/concise.
- All necessary assumptions are included and well justified or it is explained why the simplification is necessary.
- There is a complete list of all variables/parameters and they are correctly classified as such (including dependent vs. independent).
- A form of a model/equation is included and explained and any necessary sources are cited. This does not have to be the final solution your group settles on ultimately.
- There is a thoughtful discussion about what is left to do and what questions remain to be answered.

For more resources, see

<https://villanova.sharepoint.com/teams/AlternativeGradingVillanova>

## Alternative Grading: Stepping out of Tradition

Four Pillars of Alternative Grading<sup>1</sup>:



1. **Clearly Defined Standards:** Students need to know what acceptable work looks like for this class. Be transparent and upfront.
2. **Helpful Feedback:** Feedback should allow the student to go back and learn and improve from it.
3. **Marks Indicate Progress:** If marks are given at all, they should indicate progress. Marks should be “informative categorical data rather than fake arbitrary numerical data.”
4. **Reattempts Without Penalty:** Revisions, reattempts, resubmissions, etc. are intended to encourage growth and learning. Penalizing this can disincentivize students.

<sup>1</sup> Talbert, Robert. “Finding common ground with grading systems.” Grading for Growth. Available online <https://gradingforgrowth.com/p/finding-common-ground-with-grading>. Accessed May 16, 2023.