

# Math 370 – Mathematical Modeling – Fall 2023

The goals of the class project are to explore, learn, and understand the different mathematical models used in other disciplines. In this project, I hope to stimulate your interests in the field of geography with applications in aerospace, and communications. The following projects have been assigned to your group.

Group	Name (team lead*)	Project
1	Calleson, Jared Evans*, Clement, Erin Elizabeth, Corea, Victor Luis	Inertial Measurement Unit (IMU)
2	Dwane, Liam Philip, Escobar Jr, Luis Enrique*, Johnson, Rachael Marie	Star Trackers
3	Le, Thai Hoang Mai, Maldonado, Brandon*, Monroy, Emery	Inclinometer
4	Osorio, Melissa, Phan, Nghia Trong, Razo, Vincent Valente*, Rico, Steven G	Geo-localization Methods
5	Rotondo, Amelia, Tafolla, Sasha Marie, Weathersby, Anthony Kyle*	Fast Terrain Graphic Visualization

## Goals:

- Understand the project and derive the models that have practical applications in industry.
- Assess and refine your models with numerous test cases and scenarios.
- Simulate numerical solutions to the model.
- Study the impacts of the parameters.
- Hypothesize and validate claims.
- Summarize your findings.

You are to perform some literature search and to read into the topic to understand the model and its application. You should keep a record of your search including the full references (books, journals, etc.) for future citations. For the assigned model, you should be knowledgeable about its applications, type of model, governing equations, terms in the equations, variables, constants, units, their ranges, assumptions, solution, and solving methods, etc. Your project should be more than just a “summary” report. You should aim at extending the current model by applying it to another model or studying the impact of certain parameters, analyzing a different scenario, etc. You should start your project as soon as you can as it will take a lot of time. Your project should yield the following three primary items (due on the of your presentation):

- 1. A well-rehearsed presentation (20+5 minutes) & a 5-page IEEE format written report**, addressing the following sections:
  - Abstract summarizing your work.
  - Introduction
    - What is your mathematical model or application?
    - What is it for?
    - What are you trying to do?
    - What are the impacts from your study/analysis?
    - Others?
  - Mathematical Model
    - What does it describe?
    - How was the model derived?
    - Meanings of your variables and parameters (type, units, range, etc.)
    - Assumptions, others.
  - Solution Process:
    - Describe the proposed work
- Address the software/code used in the simulation
- Verify your claims numerically.
- e. Conclusions:
  - Your contributions
  - Summarize your work and your findings
- f. Reference:
  - Cite any sources that you have used, including internet findings
- 2. Computer codes used for the project.**
  - Each computer code used for the project must have detailed comments, including the functionality and description of all input and output variables.
  - You need to provide a readme.txt file explaining the chronological procedure how to run the codes.
- 3. Self-evaluation of your contribution to the project**