

# EL 2301 (Modeling and Simulation)

The University of Texas at El Paso – Fall 2020

## Course Overview

### Instructors:

**Scott Starks, PhD, PE, Professor of Engineering Leadership**

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Office Hours: 1:00 – 2:30 Tuesdays and Thursdays

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Office Hours:

### Course Details

Course Number: EL 2301

Meeting Room Number: Blackboard Collaborate

Meeting Times: Tuesdays and Thursdays from 10:30 – 11:50 AM

### Required Texts and Materials

All required reading materials will be posted on Blackboard. No textbook is required!

A note on the readings: many of the readings deal with learning to do things (e.g., work with MATLAB). Reading alone does not help you learn to do things -- rather, you need actually to DO the thing. Therefore, the approach you take to this reading should be somewhat different from the approach you might take when reading (insert your favorite author here). Rather than relaxing on a couch, sipping tea, and casually contemplating the beauty of modeling as you read, you should be trying stuff out on your computer or on paper as you read. Much of the reading is written in a way that encourages you to do exactly this; you'll find you learn a lot more from the reading if you try the examples, etc. as you read. Yes, this will take longer. But you will learn the material so much better and thank yourself for it in the long run!

*Each student must obtain a current copy of MATLAB for his or her personal computer. The most recent can be obtained from the University at <http://etc.utep.edu/software/repository.htm>. You may also be able to get a free copy if you contact ETC directly. The ETC Staff will also assist you in the installation if you need help.*

You will also need a copy of *Leadership: Theory and Practice*, 8<sup>th</sup> Edition by Peter G. Northouse ISBN-13: 978-1483317533.

### Course Schedule

The complete and up-to-date course schedule can be found on Blackboard. This schedule is likely to change, so be sure to check it often!

## Grade Breakdown

Item/Deliverables	Percentage of Final Grade
Learning Check Points/Assignments	10
Quizzes	20
Project A: Personal Finance (Individual)	10
Project 1: Population Dynamics (Individual)	20
Project 2: Engineering System (Team)	30
Leadership Exercises	10
<b>Total</b>	<b>100</b>

## Attendance

With the ongoing challenges of the COVID pandemic, we realize that life for all of us is going to be unpredictable this semester. We are doing our best to structure this course such that you are able to meet the course objectives, while having flexibility for when life happens. Therefore, we are not making attendance an individual component of your grade. Further, we will be recording all sessions and making materials available after the lecture (and in advance when possible) so that you can be self-paced and stay on track even if you are not able to attend all classes.

That being said, this class does have a team-based project component and will use class-time heavily to complete assignments and practice what you are learning. Therefore, missing class is likely to impact your course grade significantly.

### *Health-related Class Absences (See also Accommodations section below)*

Please regularly evaluate your own health according to current [CDC](#), State of TX, and your local city guidelines. We realize this class will only meet remotely, but just a reminder to not attend class or other on-campus events if you are ill. In the event that you are feeling ill, you are encouraged to seek appropriate medical attention for treatment and worry about class later. Then, email your professors about your absence as soon as you are able so that appropriate accommodations can be explored.

## Course Deliverables

### *Learning Check Points*

In addition to the in-class activities and assignments designed to help you learn the content, you will be given somewhat meatier out-of-class assignments that require more in-depth work and understanding of the material. Learning Check Points will generally be done outside of class time, although we will sometimes devote some time to them.

Learning Check Points will be graded in a binary fashion - they are either checked off as correct, or they are not. If you do not complete a Learning Check Point correctly at first, you

are free to work on it some more until you get it right, and then get it checked off only once you have completed it correctly.

While we encourage you to discuss Learning Check Points with your colleagues, they are intended to provide a way to check that you individually understand the material. So, while it is fine to talk about how to approach a Learning Check Point, to look at someone's code, and to collaboratively work through a problem at the whiteboard, in the end you should only turn in work that you can reproduce and explain on your own. Learning Check Points must be completed by the start of class time on the assigned due date.

### ***Quizzes***

At times throughout the semester, you will be given Quizzes to assess your course readiness. They typically will occur outside of class time in Blackboard. These Quizzes will require both application of and reflection on the content you are being assessed on. We will give you ample notice and time to complete the quizzes, but there will be no make-ups on Quizzes. You will want to keep a close eye on Blackboard to make sure you do not miss anything. These quizzes will cover both the leadership text as well as the modeling and simulation components of the course.

### ***Projects***

There are three major projects this semester.

1. Project A is rooted in the field of personal finance. It will entail programming a spreadsheet in Microsoft Excel to explore a situation rooted in personal finance.
2. Your second project (Project 1) be an individual project. It involves a project focused on the study of population dynamics. All students will be exploring a similar modeling and simulation topic, namely the population dynamics of a three species system. It involves aspects of predator/prey dynamics along with symbiosis. It involves the solution of a system of coupled difference equations. This project is heavily scaffolded in that you will be guided toward a solution. Each student will produce an individual ***timeline*** that consists of several project deliverables that will be specified by the Instructors. In the end, each student will pose a question about population dynamics and use their model/simulation to answer the question.
3. The third project (Project 2) is a group project in which your team will address a question of their choice about a topic drawn from science or engineering. It is required that the system under consideration is based on a first order differential equation or a system of first order differential equations. Teams should mimic the steps that were learned in the second project as a means for addressing the topic of the third project.

Each project ends with the creation of material that communicates your work:

- A written ***report*** that summarizes findings in Project A.
- A ***timeline*** that documents required ***deliverables*** for Project 1. In addition, each student should address the answer to the question that they pose along with how they utilized their model/simulation to address it for Project 1. Each student will make a short oral ***presentation*** of their findings.

- For Project 2, teams are required to produce a conference style *poster*. Each team will organize and make a *presentation*, in the style of a poster session for a scientific conference.

Don't be scared of a *timeline*. It is just a collection of all the work (folder) that you did on a project. As you work on your Timeline during Project 1, you can take advantage of the ability to post your work and receive constructive criticism via the course Jamboard (we'll explain this more later). Creating visual representations of your ideas, and using those to inform your subsequent work, is a really handy approach. You can replicate the process used in Project 1 to fulfill completion of Project 2.

Interim and final *deliverables* for projects should be submitted via Blackboard at the start of class on the assigned due dates. Because you will be submitting your materials electronically, please send it as a PDF file including your **Last Name** along with the **Deliverable Number** using the following convention: *LastName-Project1Deliverable1.pdf*.

Each project provides an opportunity for students to apply basic disciplinary knowledge and strengthen their skills in modeling and simulation. Both the technical quality of your work and the professionalism of your presentation will be assessed in the course.

### ***Submitting and Completing Assignments***

You are required to submit deliverables via the course's Blackboard website as a PDF file, unless otherwise indicated. The PDF file that you submit should include your Last Name along with the name of the Diagnostic/Assignment. For example: *Mendez-Diagnostic2.pdf*.

## **Course Goals and Objectives**

This course will provide development and assessment of the following competencies:

- Oral and Visual Communication
- Qualitative Analysis
- Quantitative Analysis
- Posing and Testing Hypotheses
- Coding in Matlab
- Difference equations and their analytical solutions
- Differential equations and their analytical solutions
- Business Acumen
- Leadership skills – Mentoring and constructive feedback

### **Student Outcomes – ABET**

**ABET Student Outcome 1.** An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science and mathematics.

**ABET Student Outcome 3.** An ability to communicate effectively with a wide range of audiences.

**ABET Student Outcome 7.** An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

### **Academic Dishonesty**

Academic Dishonesty is taken very seriously. Students are encouraged to collaborate on most assignments throughout the semester but all graded materials must represent the student's individual work. (When in doubt, ask your instructor!) Scholastic dishonesty is the attempt to present the work of somebody else as his or her own work or attempting to pass any examination by improper means. It is a serious offense and will not be accepted. Any academic misconduct will be handled according to the current university policy and will be reported. In accordance with University regulations, scholastic dishonesty on a given assignment will be referred to the Dean of Students and may result in a zero on the assignment, an "F" in the course, or even suspension from the university. If you need assistance with your assignments, please consult authorized sources of help. For more information on Academic Dishonesty visit the Dean of Students or <http://studentaffairs.utep.edu>.

### **Special Accommodations**

We are committed to working with students with pre-existing medical and mental health needs, as well as new needs that may arise within the semester. We encourage you to reach out to us as early as possible to discuss any adjustments you think may be necessary in this course. Reasonable accommodations may include leveraging the course modules that have been developed in creative ways to maximize your access during times when students need to quarantine due to COVID exposure, or during an absence related to a disability or COVID-19 diagnosis for yourself or someone you care for. While we cannot guarantee any specific outcome, we are committed to working with you to explore all the options available in this course. If you would like to request special accommodation due to a disability or illness, we can certainly work that out. Please contact The Center for Accommodations and Support Services via their website <http://sa.utep.edu/cass/>.