Class Syllabus: EL 2301 – Modeling and Simulation
Fall Semester 2017 (3 Hour Credits – Lecture)

TIME: 3:00 – 4:20 Mondays and Wednesdays

PLACE: CRBL 101, E-LEAD Design Studio

INSTRUCTOR INFORMATION:
Dr. Scott Starks, Ph.D., P.E.
Room E 230B
Office Hours: 1:30 – 3:30 Tuesdays and Thursdays or by appointment
Appointments can be arranged by email (sstarks@utep.edu)

CATALOG DESCRIPTION: This course investigates the broad scope of engineering leadership with a focus on requisite skills and practices. Topics include design, leadership theories and practices, and contemporary issues in which engineering leadership plays a role. *MOD/SIM* provides an introduction to mathematical modeling and computer simulation of physical systems.

PREREQUISITE: MATH 1312 with a grade of "C" or better. MOD/SIM is a REQUIRED COURSE E-LEAD curriculum.

COURSE DROP DEALINE: November 3, 2017.

TEXTS and READINGS:
- Readings will be posted in PDF form on the course's Blackboard website. These will be assigned on a frequent basis.
- "CAT Book," by Allen Downey. This book is intended to introduce students to Matlab Programming. It can be downloaded from Blackboard.
- "Leadership: Theory and Practice," Peter G. Northouse, Sage Publishing.
- Recommended: "Matlab, A Practical Introduction to Programming and Problem Solving," by Stormy Attaway, Elsevier Publishers, 2016. This represents a more thorough and rigorous treatment of Matlab.

SPECIFIC OUTCOMES OF THE COURSE: Students completing the course will be able to:
1. Practice the steps involved in modeling physical systems using difference and differential equations (ABET General Criterion 3 (a)),
2. Utilize simulations to explain and predict the behavior of physical systems. (ABET General Criterion 3 (a)).
3. Apply programming skills to create computer simulations. (ABET General Criterion 3 (k)).
4. Develop simulations that support making decisions in the field of business.(ABET General Criterion 3 (h)).

TOPICAL OUTLINE:

- Introduction to Stock and Flow Diagrams
- Mathematical Modeling of Population Dynamics using Difference Equations
- Simulating Business/Financial System using Excel
- Introduction to Matlab Programming
- Simulating Population Dynamics – Individual Project
- Mathematical Modeling of Physical Systems using Differential Equations
- Solution of Differential Equations using Matlab
- Simulating Physical Systems – Team Project
- Behavioral and Situational Approaches to Leadership

ATTENDANCE: Attendance in class is a required component of any college level course and is therefore not included as a separate component of your final grade. Absence from class will prevent you from being able to complete in-class assignments and fully engage in learning activities specifically designed to help students apply the material from their readings. In-class activities and diagnostics cannot be made up without prior approval from the instructor. Students with more than 3 absences may be dropped from the course.

COMPUTER REQUIREMENTS:

- Students must bring their laptops to class every period.
- Each student must obtain a current copy of Matlab for his/her laptop. (Students can receive assistance from the Engineering Technology Center.)

COURSE BINDER: Students are required to maintain a binder that includes all printouts, handouts, returned homework, project deliverables, computer programs, exams, and other pertinent information about the course. This material will help you document what you have learned during the semester. You will turn in your binder at the end of the semester. Keep it well organized so that you can get the full 10% toward your final grade in the course.

LEADERSHIP READINGS:

The text "Leadership, Theory and Practice" by Peter Northouse provides readers with information on leadership practices and styles. Each required Engineering Leadership course has been assigned one or two chapters from this text. Chapter 4 (Behavioral Approach) and Chapter 5 (Situational Approach) have been selected for inclusion in MOD/SIM. You will read and complete exercises on these two chapters.

IN CLASS LEARNING CHECKPOINTS: On a fairly regular basis, you will be given short in-class assignments which are called *In Class Learning Checkpoints*. Think of these as quick, check-in quizzes. They can typically take about 10 minutes and are meant to help you make sure you have sufficient understanding of the material required for the activities that we will be doing in class that day.

In-class Learning Checkpoints must be checked off in class by showing your results to one of the instructors. If your results are correct, you'll be told, "Congrats! You're done!" If there's some problem with your answers, we'll give you some suggestions, and tell you to work on it some more

OUT OF CLASS LEARNING CHECKPOINTS: We will also often give you somewhat meatier out-of-class assignments that require more in-depth work and understanding of the material. *Out of Class Learning Checkpoints* will generally be done outside of class time, although we will sometimes devote some class time to them. *Out of Class Learning Checkpoints* will be graded in a binary fashion - they are either checked off as correct, or they are not. If you do not complete an *Out of Class Learning Checkpoint* 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.

Out of Class Learning Checkpoints must be completed by the start of class time on the assigned due date to receive full credit.

While you are encouraged to discuss *Out of Class Learning Checkpoints* 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 an *Out of Class Learning Checkpoint*, 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.

PROJECTS: There are three major projects this semester. The first is an individual project that will focus on difference equations. A second individual project will be conducted in order to enhance your business acumen. Lastly, a group project that utilizes first order differential equations will be assigned.

In the first project all students will be exploring a similar modeling and simulation topic. The business acumen project will be highly individualized. It is intended to provide an opportunity for students to pose and solve an authentic problem of their own choosing. The third project provides an opportunity for students working in teams to apply basic disciplinary knowledge and strengthen their skills in modeling and simulation of physical systems.

Each project ends with the creation of a material that graphically communicates your work, a formal presentation, in the style of a poster session at a scientific conference. Both the technical quality of your work and the professionalism of your presentation will be assessed.

SOME THINGS YOU WILL LEARN IN THE COURSE:

- Qualitative Analysis
- Quantitative Analysis
- Posing and Testing Hypotheses
- Difference equations
- Differential equations
- Coding in Matlab
- Leadership skills – Mentoring and constructive feedback
- Elements of business acumen
- Oral and Visual Communication

SPECIAL ACCOMODATIONS:
If you would like to request special accommodation due to a disability, we can certainly work that out. Please contact The Center for Accommodations and Support Services via their website http://sa.utep.edu/cass/.

ACADEMIC DISHONESTY:
Cheating 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 professor!) 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 .

GRADING POLICY:

In-Class Learning Checkpoints and Exercises/Quizzes	15%
Out of Class Learning Checkpoints	15%
Project 1 (Population Dynamics – Difference Equations)	15%
Project 2 (Business Acumen)	15%
Project 3 (Physical Systems – Differential Equations)	20%
Leadership Readings (Northouse)	10%
Course Binder	10%
	100%

90%- 100%	A
80% - 89%	B
70% - 79%	C
60% - 69%	D
less than 60%	F