

Instructor

Kevin M. Taaffe, Ph.D.  
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269 Freeman Hall  
656-0291

Office Hours

Mon/Tues 1:00pm-2:00pm, or by appointment

Course Assistant

Amin Khoshkenar ([akhoshk@clermson.edu](mailto:akhoshk@clermson.edu))  
Office Hours: None scheduled

Class Hours

MW 2:30pm-3:45pm, 138 Freeman

Computing Resources

AnyLogic may be loaded onto a personal laptop. You will need a personal laptop!

References

Morecroft, *Strategic Modelling and Business Dynamics: A Feedback Systems Approach*, Wiley, 2007, ISBN: 978-0-470-01286-4.

Sterman, *Business Dynamics: Systems Thinking and Modeling for a Complex World*, McGraw-Hill, 2000.

Law, *Simulation Modeling and Analysis*, McGraw-Hill, 5<sup>th</sup> Edition, 2015, ISBN 978-0-07-340132-4.

Borshchev, A., *The Big Book of Simulation Modeling*, ISBN 978-0-9895731-7-7.

There will be papers (and chapters from textbooks) that will be introduced throughout the semester.

Prerequisites

Prior simulation course or consent of instructor.

Main Objectives and Course Outline

IE 8870 combines the treatment of the well-known simulation subject of discrete event modeling, with an bridge to the inclusion of system dynamics and agent-based modeling. These additional simulation concepts allow for many social and behavioral systems to be modeled more accurately. Advanced topics that focus on input and output analysis may also be discussed. Finally, modeling concepts will be motivated with several real-world examples from representative fields.

A brief outline of topics follows:

- I. Discrete Event Simulation (DE)
  - a. Event-based Modeling
  - b. Basic Programming
  - c. Process-based Modeling
- II. System Dynamics (SD)
- III. Agent-based Modeling (AB)
- IV. Applications of SD, AB, and DE
  - a. Pandemic disease
  - b. Virus dynamics
  - c. Supply chain logistics and behavior
- V. Simulation Analysis
  - a. Input Uncertainty
  - b. Ranking and Selection

Grading

Quizzes (2)	20%
Homework Assignments (5)	40%
Research Project	40%

Grading scale will be 90-100 (A), 80-89 (B), 70-79 (C), below 70 (F). If you score in the appropriate range, you are guaranteed at least that grade.

Quizzes

Quizzes will be given at the beginning of class and may last the entire period, depending on the level of difficulty. You will be notified in advance of the date for each quiz. The questions may be based on lecture or homework, or in some cases short modeling exercises may be given.

Homework Assignments

Homework assignments must be turned in before class on the assigned due date. Each assignment should be completed individually, unless specified by the instructor. You can consult with classmates regarding simulation modeling issues, but each person should still develop their own model. No late submission of work will be accepted. If you are away from campus (or computing facilities) for authorized reasons on the assigned due date, you should submit your work early.

Research Project

Based on the modeling methodologies and analytical methods described in class, each student must complete a simulation-based research project. Here are the guidelines:

1. Identify a topic and determine how to simulate and provide insight into the particular operation, process, or system. You may select a topic based on your personal research interests, local business operations, or existing research samples (the Winter Simulation Conference website has years of archived research papers located [here](#)).
2. You should develop an Anylogic model of your selected topic using discrete event modeling, system dynamics, agent-based modeling, or a combination of these. The model should be functional, but you DO NOT need to conduct a full output analysis. Insights and observations based on selected input parameters will suffice.

Specific criteria or guidelines will be discussed in class. Your project should demonstrate the use of simulation in solving a difficult problem found in research or practice. Since there can be considerable variability in the technical effort required, your exact topic must be approved by the instructor first.

Re-Grading and Make-Up Policies

All requests for re-grades must be submitted, with a brief description of the item in question, no later than one week after the assignment was returned to you. Keep in mind that such requests are completely re-graded, and this may not always work out in your favor if there were any error oversights in the original grading.

If you miss an assignment due date to a personal medical emergency, you must submit valid proof. Incomplete grades will be given only if you have a valid medical reason and proof for not completing the requirements of the course.

Attendance

Attendance at lectures is not mandatory but is expected. However, each student is responsible for all information distributed and/or presented during lecture periods.

The students are authorized to leave if the instructor is more than 15 minutes late for a lecture. However, every possible effort will be made to inform you for any classes that are canceled due to an unscheduled conflict or emergency.

#### Online Teaching Resource – Canvas

All course-related material and communications will be provided through Canvas.

#### E-mail

You are responsible for all e-mail messages sent by the instructor or teaching assistant. Public messages intended for the entire class are sent automatically to campus accounts. If the student elects to forward campus mail to an off-campus account, the student remains responsible for these messages regardless of whether or not they are successfully delivered.

#### Course Policies

You are encouraged to discuss the course material with other students. However, you are required to work independently on homework assignments and within your group pairings for lab assignments. Copying or plagiarism will be treated as academic dishonesty and will be handled according to university regulations. Students are expected to conduct themselves both in a professional manner and in accordance with the University's statement regarding academic integrity:

*“As members of the Clemson University, we have inherited Thomas Green Clemson’s vision of this institution as a “high seminary of learning.” Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form.”*

NOTE: When, in the opinion of a faculty member, there is evidence that a student has committed an act of academic dishonesty, the faculty member shall make a formal written charge of academic dishonesty, including a description of the misconduct, to the Associate Dean for Curriculum in the Office of Undergraduate Studies. At the same time, the faculty member may, but is not required to, inform each involved student privately of the nature of the alleged charge.

Disability access statement from the Office of Student Disability Services:

*“It is University policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have disabilities. Students are encouraged to contact Student Disability Services to discuss their individual needs for accommodation.”*

Students with disabilities requesting accommodations should make an appointment with Dr. Arlene Stewart (656-6848), Director of Disability Services, to discuss specific needs within the first month of classes. Students should present a Faculty Accommodation Letter from Student Disability Services when they meet with instructors. Accommodations are not retroactive and new Faculty Accommodation Letters must be presented each semester.

Title IX Sexual Harassment:

Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at <http://www.clemson.edu/campus-life/campus-services/access/title-ix/>. Ms. Alesia Smith is the Clemson University Title IX Coordinator, and the Executive Director of Equity

Compliance. Her office is located at 111 Holtzendorff Hall, 864.656.3181 (voice) or 864.565.0899 (TDD).

**Prerequisites:**

Prerequisites will be strictly enforced. Barring a successful appeal, you will be dropped from the roll if you lack these prerequisites, even if the deficiency is discovered after the drop/add period has lapsed.

**Emergencies:**

Emergency procedures have been posted in all buildings. Students are reminded to review these procedures for their own safety.