

1. Course number and name
EML 4930 Modeling and Simulation
2. Credits and contact hours
3 cr, 2.5 contact hours (2 hrs. 30 min. lecture)
3. Instructor's or course coordinator's name
Instructor: Dr. Patrick Hollis, Coordinator: Dr. Jonathan Clark
4. Text book, title, author, and year
None Required
 - a. *References:*
 - Computer-Aided Kinematics and Dynamics of Mechanical Systems, Haug, E. J., 1989
 - Numerical Methods Using Mathcad, Fausett, L. V., 2001
 - Numerical Methods, Dahlquist, G. and Bjorck, A., 1974
 - System Dynamics: Modeling and Simulation of Mechatronic Systems, Karnopp, D. C., Margolis, D. L., and Rosenberg, R. C., 2006
5. Specific course information
 - a. *brief description of the content of the course (catalog description)*
Introduction to various concepts of modeling and simulation of mechanical systems: models of systems, numerical solution of ODEs, software tools for modeling and simulation of complex mechanical systems.
 - b. *prerequisites or corequisites*
Prerequisites: EML 3014C, EML 3018C
 - c. *indicate whether a required, elective, or selected elective course in the program*
Selected Technical Elective course
6. Specific goals for the course
 - a. *Course Outcomes*
By the end of the course, a student should be able to:
 1. Model simple jointed systems [1]
 2. Simulate simple jointed systems [2]
 3. Model and simulate other systems in mechanical engineering [1, 2]
 4. Model simple systems using multiple techniques [3]
 5. Simulate various mechanical systems [4]
 6. Simulate coupled mechanical and non-mechanical systems [5]
Numbers refer to Course Objectives below, e.g. for course outcome 3, [1.2] refers to course objectives 1 and 2.
 - b. *Course Objectives and Relation to Student Outcomes*
 1. Model various mechanical systems [5, 10]
 2. Simulate various mechanical systems [5, 10]
 3. Choose appropriate modeling techniques [5]
 4. Use suitable simulation techniques, and understand various parameters in simulation techniques [5, 10]
 5. Model and simulate complex mechanical systems using multiple tools simultaneously [5, 10].
Numbers refer to Departmental Student Outcomes, e.g. for course objective 1, [5, 10] refers to student outcomes 5 and 10.
7. Brief list of topics to be covered

- Modeling of Mechanical Systems
- Simulation of Mechanical Systems
- Solution of ODEs
- Modeling and Simulation techniques and software
- Complex Systems