

SYSTEM DYNAMICS MODELING OF DEVELOPMENT PROJECTS

CVEN 5837 (1 credit hour)

January 16-February 15, 2018

Instructor

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Prerequisite: Graduate level

Course web site: <https://www.colorado.edu/mcedc/education/edc-courses/cven-5837-1-credit-hour-session>

Course Description

The purpose of this 5-week long course is to introduce engineering students to system dynamics and its applications in addressing ill-defined and complex development projects. Throughout this course, students will be presented the fundamentals of systems thinking, complexity science, how to model various problems using the STELLA-Pro software, and how to use system dynamics to decide on interventions at the project level.

At the end of this course, students should be able to:

- Identify the multiple dimensions of engineering projects
- Understand the global interconnectedness of issues at different scales from the local to the global and why a systems approach can complement a more traditional linear approach;
- Formulate problems and their solutions in a more systemic and integrated way;
- Be familiar with a range of decision making tools.

Class Hours and Location: Tu and Th 3:30-4:45 pm (Fleming 103)

Preliminary Course Content (10 lectures)

1. Course Overview and Introduction. Introduction to Systems Thinking (1 lecture)
2. A Systems View of the World (1 lecture)
 - Looking at the world as a system of systems
 - Systems science and complexity science
 - System thinking
 - Methods of decision making
 - Simple, complicated, and complex systems
3. Introduction to System Dynamics (4 lectures)
 - Components of system dynamics
 - System dynamics modeling
 - Stella Professional software

4. Systems Approach to Management of Development Projects (3 lectures)
 - Stages of project management
 - Role of non-technical issues in all stages of project management
 - The non-technical dimensions of engineering innovation. Who benefits?
 - Right projects, done right, and for the right reasons. Who decides and participates?
 - Collecting and analyzing data for systems modeling
 - Defining issues and their dynamic hypotheses
 - Social network analysis and GIS
 - Methods of decision making, importance of perspective (Zoom)
 - Capacity, vulnerability, and risk analysis
 - Developing an implementation plan
 - Failure and the engineering mindset
 - The ethical dimensions of failure
 - Deciding when faced with uncertainty and complexity
 - Biases and cross-cultural communication
5. Presentation of projects (1 lecture)

Assignments and Grades

Student grades will be determined based on in-class participation (20%), homework assignments (40%), and project (40%).

Accommodations for Disability

If you qualify for accommodations because of a disability, please submit to your professor a letter from Disability Services in a timely manner (for exam accommodations provide your letter at least one week prior to the exam) so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities. Contact Disability Services at 303-492-8671 or by email at dsinfo@colorado.edu. If you have a temporary medical condition or injury, see [Temporary Injuries guidelines](#) under the Quick Links at the [Disability Services website](#) and discuss your needs with your professor.

Religious Holidays

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, (insert your procedures here). See the [campus policy regarding religious observances](#) for full details. For more information on the religious holidays most commonly observed by CU Boulder students consult the [online interfaith calendar](#).

Classroom Behavior

Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, color, culture, religion, creed, politics, veteran's status, sexual orientation, gender, gender identity and gender expression, age, disability, and nationalities. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. For more information, see the policies on [classroom behavior](#) and [the student code](#).

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

The University of Colorado Boulder (CU Boulder) is committed to maintaining a positive learning, working, and living environment. CU Boulder will not tolerate acts of sexual misconduct, discrimination, harassment or related retaliation against or by any employee or student. CU's Sexual Misconduct Policy prohibits sexual assault, sexual exploitation, sexual harassment, intimate partner abuse (dating or domestic violence), stalking or related retaliation. CU Boulder's Discrimination and Harassment Policy prohibits discrimination, harassment or related retaliation based on race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. Individuals who believe they have been subject to misconduct under either policy should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-2127. Information about the OIEC, the above referenced policies, and the campus resources available to assist individuals regarding sexual misconduct, discrimination, harassment or related retaliation can be found at the [OIEC website](#).

Honor Code

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the [academic integrity policy](#) of the institution. Violations of the policy may include: plagiarism, cheating, fabrication, lying, bribery, threat, unauthorized access, clicker fraud, resubmission, and aiding academic dishonesty. All incidents of academic misconduct will be reported to the Honor Code Council (honor@colorado.edu; 303-735-2273). Students who are found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code Council as

well as academic sanctions from the faculty member. Additional information regarding the academic integrity policy can be found at <http://honorcode.colorado.edu>.