Course Description:
This course provides an introduction to systems science theory and practice. Systems science theory is explored through the fundamentals of systems thinking theory, and theory of knowledge. Systems science practice is explored through system dynamics modeling techniques for simulating socio-technical systems, structures, and processes.

It is of vital important to stress that learning Systems Thinking is a personal journey, and as such, each student will experience the journey differently. The class is designed to provide a baseline or a roadmap for the journey, assignments and timing of lectures may be adapted in order to accommodate the majority of class learning progress if needed.

This course combines approximately 120 hours of instruction, individual readings, interactive in-class discussions, and assignments for 4 credits

Topics:
- **Systems Science Theory Fundamentals**
  - General systems thinking
  - Theory of knowledge
- **System Dynamics**
  - Systems archetypes
  - Causal loops diagrams
  - Stock and flow diagrams
  - Software simulation

Learning Outcomes:
The student, upon completion of this course, will be able to:

1. Describe (identify/write) the underlying concepts of systems science (e.g., what is a system, what is dynamic complexity, what is a problem context).
2. Describe the role that knowledge has on understanding holistically (ontologically and epistemologically) socio-technical systems from an engineering perspective.
3. Describe socio-technical systems as conceptual ecologies through the use of systemic archetypes.
4. Develop the theory to describe dynamic complexity within socio-technical systems.
5. Show how socio-technical systems’ complex behavior over time is dependent on linear, non-linear and time-delayed interactions.

Prerequisites: IE or similar engineering BS degree – or with instructor approval.

Instructor: Javier Calvo-Amodio, Ph.D.
Assistant Professor
School of Mechanical, Industrial and Manufacturing Engineering
Oregon State University
410 Rogers Hall | (541) 737-0696 |
Office hours: By appointment only.
Class Meeting Time and Room:
TBD.

Suggested Text (not required):
- Selected readings to be provided by instructor.

Grading Policy
All students MUST hand in assignments at the specified dates and times (in this syllabus or as indicated by me). It is the students’ responsibility to know the due dates of all assignments and participate in class. Exceptions to this policy must be cleared with the professor prior to the assignment’s due date (as soon as possible) or by presenting a justifiable cause.

<table>
<thead>
<tr>
<th>The grading scale is as follows</th>
<th>The grading will be based on the following assignments:</th>
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<tbody>
<tr>
<td>90 – 100 ⊆ A</td>
<td>In-class participation based on Selected Readings 10%</td>
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<tr>
<td>80 – 89 ⊆ B</td>
<td>Challenges 40%</td>
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<td>70 – 79 ⊆ C</td>
<td>Systemic Exercise 1 15%</td>
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<tr>
<td>60 – 69 ⊆ D</td>
<td>Systemic Exercise 2 15%</td>
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<tr>
<td>below 60 ⊆ F</td>
<td>Final Project 20%</td>
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Policy Regarding Students with Disabilities
Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 541-737-4098.

Policy Regarding Student Academic Dishonesty and Conduct
Instances of student academic dishonesty and improper conduct will be dealt with according to University policy. Students are referred to http://studentlife.oregonstate.edu/studentconduct/offenses-0 for a definition and examples of academic dishonesty and improper conduct.

If you are not sure what plagiarism means, make sure you find out before you hand in your first assignment; **IGNORANCE IS NOT BLISS**.

Administrative Issues
1. Classes will begin promptly at the specified time. Due diligence is expected. Please let me know as soon as possible if you have a planned absence in class.
2. While in class please turn off (or put on silent mode) your cell phone. If for emergency reasons you must use your cell phone, please quietly leave the classroom to do so. (*Do not answer while inside the classroom!*)
3. I reserve the right to append this syllabus as needed depending on progress and group dynamics.