University at Albany
RPAD 724: Simulation for Policy Analysis and Design (10429)– Spring 2016– (3-6 credits)
TH 04:15 PM-07:05PM, BB0133

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Course Description
This course provides advanced instruction and practice in the use of simulation science in support of strategic or policy change.
The course includes in-class simulation as well as lectures. Simulation exercises provide group-driven interactive learning. Lectures will include problem structuring, formulation, and model validation. The course is offered at variable credit levels to support multiple student populations.

Required Text and Materials
The required text for the course is Sterman, Business Dynamics (2003), McGraw Hill. There are also be numerous articles on Blackboard. You will need Internet access for Blackboard, reserve readings, and computer simulations. All readings are required and expected to be completed before the assigned class.

Learning Objectives
By the end of this course you will:
- Learn how to use concept models and generic structures;
- Identify the role of systems archetypes in communicating model information
- Learn introductory control theory and PID controllers
- Experiment with data fitting and statistical analysis of modelsReview current standards for model validation.

Assessment
You will demonstrate your accomplishment of course objectives through:
- Completion of homework assignments (50%). Assignments are graded on a 10 point scale, and weighted based on course enrollment
- Final Project. During the course you will develop a project supporting your research interests. You will present progress reports during the semester, and a final model-based paper at the end of the course. This is a paper that can be submitted for presentation to the NTIR Conference or to the International Conference of the System Dynamics Society, which will take place in Delft, The Netherlands this year. You are also expected to participate actively in the discussion and review of the works presented by others (40%).
- Instructor's subjective judgment of class participation and engagement (10%)

Policy on Plagiarism and Cheating
This is an intensive course and students are **encouraged** to form study groups. Learn by interacting, suggesting, supporting and challenging one another. Assignments, however, should be completed individually. As a policy for this course, plagiarism (copying without citation) or cheating (copying without adding value) will result in a failing grade for the whole course. For the purpose of this course, the following are taken as evidence of plagiarism or cheating:

- Material reproduced from another source without any or adequate citation.
- Identical answers being turned in by two or more students.
- Written answers or solutions that a student cannot logically explain verbally.
- Other evidence of collaboration between students on an in-class or take-home assignment that was intended to reflect individual effort.

Attendance
Students are expected to attend and to participate in each class session.

ITM / PAD 724 Readings and Assignments (as of 10 January

No	Date	Topic	Description	Readings (Before Class)	Exercises / Projects Due
1	21-Jan	Introduction, overview	Course requirements. Review of structure building blocks.	Richmond, "An academic users guide to Stella", Chapter 8.	Molecules exercise (new)
2	28-Jan	Formulation I	Developing Concept Models Welfare1, Welfare2, Welfare3 Basel1, Basel2, Basel3 Norway1, Norway2, Norway3, Norway4	Concept Model Paper; Sterman 11, 12. 13.1-13.2.7	Project proposals
3	4-Feb	Formulation II	Generic structures, System archetypes Archetypes PPT Sliding goals in student achievement	Kim, Systems Archetypes Meadows Whole Earth Models Braun: The system archetypes	Co-flow exercise Naill model
4	11-Feb	Formulation III	Classical control theory	Feedback Thought 2,3	Archetypes related to the project
5	18-Feb	Conceptualization	Communicating Structure Diagramming in PowerPoint		Project diagrams
6	25-Feb	Conceptualization	Project Presentations	Morecroft, strategy; Morecroft Microworlds Sterman 15	PID Controllers
7	3-Mar	Conceptualization	Group Model Building Norway September 2005 Recent advances in GMB Models: See week 2 for Norway concept models, HYDRO1 model	Teamwork in GMB SD in group decision and negotiation	
8	10-Mar	Conceptualization & Formulation	Parameters and initial values Continuous logic & and other difficult formulations	Sterman 14, 16	
	17-Mar	BREAK			
9	24-Mar	Validation	Understanding model behavior sensitivity	Sterman 21	Project reports
10	31-Mar	Validation	Fitting to data; Optimization; Theil statistics Petroleum fit description Petroleum fit optimization Population fit optimization Sliding goals optimization Theil stats in VENSIM	Sterman 21.4.7; Graham, Parameterization	Analytic initialization
11	7-Apr	Projects	Model evaluation: what is good (or bad) work?	Article to review for class	Model analysis report and model
12	14-Apr	Validation	Tests for building model confidence; Validation - Forrester and Senge; updates	Forrester and Senge Sterman 21	
13	21-Apr	Validation	Final presentations		PowerPoint presentation and model
14	28-Apr	Projects; Last Class	Written projects due		Project reports