University at Albany
Rockefeller College

January 2005
PAD324 **Syllabus**

P A D 3 2 4
Policy Analysis in Complex Systems

"The best scientists are their own most severe critics." (Deary 2001)

Instructor:	Ignacio J. Martinez-Moyano
Office:	Milne Hall 318, (518) 442 3859
Office hours:	To be determined. Either uptown, or in my office downtown. By appointment; call or email me.
Email:	im7797@albany.edu
Personal web page:	www.albany.edu/~im7797
Course web page:	http://www.albany.edu/~im7797/PAD324/PAD324.html

Purpose: This course teaches the basic principles of system dynamics with a hands-on approach involving frequent problem sets and case studies. Students will learn the basic principles governing systems modeling as well as how to create computer-based simulation models. Introduction to System Dynamics is designed to develop skills in the creation and use of computer simulation models for policy analysis. A principle focus of the course is the significance of information feedback and circular causality in the behavior of social systems

System Dynamics is a powerful computer simulation technique developed at MIT for modeling social, technological, ecological, economic, and management systems among several. System Dynamics applies computer simulation to the study of feedback-rich systems in the social, behavioral, environmental, management and policy sciences

NO PRIOR COMPUTER MODELING EXPERIENCE IS NEEDED

Text: Required: **Sterman (2000), Business Dynamics: Systems Thinking and Modeling for a Complex World (Irwin McGraw-Hill)**
Additional: Richardson and Pugh (1981), Introduction to System Dynamics Modeling; Richardson (1991) "Feedback Thought in Systems Theory and Social Sciences"

Readings: Main readings are from Business Dynamics. Additional readings will be posted on the website of the course or will be assigned for research. The syllabus indicates which sections you should be sure to read to learn the material you will need to do the assignments, and which sections you can skim (NOTE: 'skim' ? 'skip').

Assignments and exams:

Assignments: Weekly reading selections and/or written assignments are due for each week. Assignments include readings in the required and optional texts plus problem sets, challenges, and case studies. The assignments are a place to develop understandings and skills.

Unless specifically stated otherwise, **you are encouraged to work on assignments in small groups and to help each other acquire skills and understanding**. Each assignment is graded on a 10-point scale. Two points will be forfeited for assignments handed in late. Assignments handed in more than 1 week late will receive no credit. This policy will be strictly enforced.

Exams: There are no exams in the course.

Grading:

Grading: Assignments (85%), Class Participation (15%)

Course Outline:

Introduction
Complex Systems
Policy Analysis
History of System Dynamics
Dynamic Time paths
Stocks and Flows
Feedback and Causal loop diagrams
S-shaped growth
Overshoot and collapse
Oscillations

Assumed Prerequisites.

This course assumes that you have basic familiarity with microcomputers, and spreadsheet software such as MS-EXCEL. The first problem set is a hands-on diagnostic exercise designed to give you information on whether or not you meet this prerequisite. A series of special laboratory sessions have been scheduled for the first two weeks of class for students who wish to polish up their micro-computing skills.

Recommended Software

Vensim PLE (Personal Learning Environment)
Word, Excel, Access, and PowerPoint are also useful

Electronic Reserve Readings

A number of the class readings will be available through the University at Albany's electronic reserve system. The electronic reserve system may be accessed from the library's home page or the class web site.

Syllabus of Topics

A syllabus of topics is attached and shows the timing of the major topics in the class along with anticipated assignments. There are problem sets in the class. Since this course is always undergoing some "redesign", I may be handing out assignment modifications some weeks as we go along. If there are significant changes, I will place an updated syllabus on the class website.

E-Mail Communication

To reach me, use my personal e-mail address (im7797@albany.edu). A class listserv has been set up with the address **PAD324@LISTSERV.ALBANY.EDU** Please register for this list as soon as possible and keep posted to it for class news and information. Also, use this listserv for sharing common concerns and issues.

Time Commitment for this course

This is a three-credit course. Hence you should plan on spending three hours per week in class and in the lab plus approximately eight hours per week doing the reading and preparing problem sets, worksheets, and cases. Students with strong prior background or experience in computing may spend less time than this. Students with little prior background may have to spend more time

than this, especially in the first several weeks. If you discover that you are spending more time than this on the course, please let me know so that we can discuss it.

Plagiarism and Cheating.

Due to the intensive nature of this course, students are encouraged to form study groups and to work together on assignments. Learn by interacting with one another--support and help one another. However, some work such as in-class or take-home exam assignments will be clearly expected to reflect individual effort. For these assignments, you are expected to neither give nor receive assistance from anyone. **As a policy for this course, plagiarism or cheating will result in a failing grade for the whole course.** In addition, as instructor, I will pursue further disciplinary action at the University level. For the purposes 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.
- A pattern of unusually similar 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.

Since this is such an important matter, if you have any questions about this course policy, you should ask me for any clarification that you may need.

RPAD 324 Introduction to System Dynamics
Detailed Listing of Readings—Spring 2005

Week	Date:	Topic	Readings Due
1	January 20	Overview, expectations and logistics. Software. Introduction	•
2	January 25	System Dynamics Tools part I—Reference Modes and Mapping	• BD Ch 1, 5.1-5.4
3	February 1	The Modeling Process	• BD Ch 2.5, 3
4	February 8	Fundamental Modes of Dynamic Behavior	• BD Ch 4
5	February 15	Mapping the Stock and Flow Structure	• BD Ch. 6 (Skim 6.2.7 to 6.2.9, 6.3.4, 6.3.6)
6	February 22	Dynamics of Stocks and Flows	• BD Ch 7
7	March 1	Dynamics of Simple Structures	• BD Ch 8 (sections 8.1 to 8.4)
8	March 8	Non-Linear Systems and Modeling Growth Processes	• BD Ch 8 (sections 8.5 to end)
9	March 15	Growth Strategies Part I—Modeling diffusion	• BD Ch 9.1 (skim 9.1.2, 9.1.3)
10	March 22	University Official Break Period	•
11	March 29	Growth Strategies Part I—Modeling diffusion	• BD Ch 9.1 (skim 9.1.2, 9.1.3)
12	April 5	Path Dependence Processes	• BD Ch 10 (skim 10.2)
13	April 12	Oscillations	• BD Ch 11 (11.1-11.4)
14	April 19	Guest Lecture: David F. Andersen	• Group Model Building
15	April 26	Guest Lecture: George P. Richardson	• System Dynamics Applications
16	May 3	Last Day of Classes	•