

## ENERGY AND MATERIALS SYSTEMS MODELING (5)

Class Number: 3812 Delivery Method: In Person

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### COURSE TIMES + LOCATION:

Mo, Th 4:30 PM – 6:20 PM  
TASC2 8500, Burnaby

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### INSTRUCTOR:

**Jon Axsen**  
jaxsen@sfu.ca  
1 778 782-9365  
Office: TASC1 8435

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### PREREQUISITES:

Permission of instructor.

## Description

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### CALENDAR DESCRIPTION:

Theory, background, and practical experience in the use of a range of techniques for policy modelling of energy and materials flows in society with the aim of demonstrating how more environmentally and socially sustainable trajectories can be achieved. Techniques include: simulation modelling, optimization modelling, econometric and other forms of parameter estimation, input-output modelling, game playing models, and integrated systems models.

### COURSE DETAILS:

This course is open to graduate students and professionals who seek a better understanding of research methods and models relating to social and technical sustainability.

### COURSE-LEVEL EDUCATIONAL GOALS:

By the end of this course, you will be able to:

1. Identify and compare the major types of research methods and models being used to inform sustainability-oriented policy within social and technical systems.
2. Explain the strengths and weaknesses of these methods and models, and identify their relative usefulness for different policy objectives or research questions.
3. Evaluate and critique studies that utilize these methods (e.g. reports and peer-reviewed articles).
4. Apply these models and methods to real-world problems in environment and sustainability, and policy.
5. Effectively communicate research results (memos, papers, presentations), including text and visual aids (tables and figures).
6. Assess and effectively communicate uncertainty in results.

## Grading

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Participation

10%

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Assignments	40%
Mid-term exam	15%
Research methods project	35%

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**NOTES:**

The course involves a mix of lectures, seminars and labs. In seminars, students are expected to play an active role in understanding and discussing the various research methods and models and their appropriateness for different policy and research objectives. Students will gain hands-on experience by applying research methods and models to simplified problems in labs and assignments. The course sections correspond to the main methods topics that will be covered, although there is room for some alteration depending on the preferences and expertise of students in a particular year.

**REQUIREMENTS:**

Because the course is taught from a basic level, a strong quantitative background is not required to do well in this course. There are no formal course prerequisites. **It is assumed that students will start the class with the following basic skills:**

- Basic level of familiarity with Excel (e.g., setting up data, writing a formula).
- Can write using technical language (in the style of research reports or peer-reviewed articles).
- Can find, review, summarize and properly cite existing literature.
- Can create tables and figures to effectively convey information.
- Basic training in statistics (e.g. means, standard deviations, t-tests).

## Materials

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**REQUIRED READING:**

Various journal articles and readings will be assigned.

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**GRADUATE STUDIES NOTES:**

Important dates and deadlines for graduate students are found here: [http://www.sfu.ca/dean-gradstudies/current/important\\_dates/guidelines.html](http://www.sfu.ca/dean-gradstudies/current/important_dates/guidelines.html). The deadline to drop a course with a 100% refund is the end of week 2. The deadline to drop with no notation on your transcript is the end of week 3.

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**REGISTRAR NOTES:**

SFU's Academic Integrity web site <http://students.sfu.ca/academicintegrity.html> is filled with information on what is meant by academic dishonesty, where you can find resources to help with your studies and the consequences of cheating. Check out the site for more information and videos that help explain the issues in plain English.

Each student is responsible for his or her conduct as it affects the University community. Academic dishonesty, in whatever form, is ultimately destructive of the values of the University. Furthermore, it is unfair and discouraging to the majority of students who pursue their studies honestly. Scholarly integrity is required of all members of the University. <http://www.sfu.ca/policies/gazette/student/s10-01.html>

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