

Fall 2020

ECE 7650 T03 – Agent Based Modeling

COURSE DESCRIPTION:

This course is about the Agent Based Modeling paradigm. Agent based modeling (ABM) is ‘bottom-up’ systems modeling from the perspective of constituent parts. Systems are modelled as a collection of agents (in social systems, most often people) imbued with properties: characteristics, behaviours (actions), and interactions that attempt to capture actual properties of individuals. In the most general context, agents are both adaptive and autonomous entities who are able to assess their situation, make decisions, compete or cooperate with one another on the basis of a set of rules, and adapt future behaviours on the basis of past interactions. Agent properties may be conceived by the modeller or may be derived from actual data that reasonably describe agents’ behaviours – i.e. their movements and their interactions with other agents.

COURSE OBJECTIVE:

ABM is becoming an alternative to various other modeling techniques. The goal of this course is to provide a background in ABM and to have students develop ABM with an emphasis on verification and validation. Two main modeling projects are the main constituents of the course. One being the modification or extension of an existing ABM and the other being a developing a more novel model of the students’ design or interest.

PRE-REQUISITES:

Undergraduate background in software.

CONTACT HOURS:

1.5-hours per week, spanning both terms.

COURSE CONTENT:

The following topics will be discussed:

- ABM introduction;
- Components of ABMs;
- Creating and extending simple models;
- Analyzing ABMs;
- Verification and validation;
- Computational roots of ABMs.

Additional advanced research topics as determined by the instructor or guest lecturers.

HOMEWORK:

Homework will consist of assignments, review of an article from the research literature, and two individual design projects.

TEXTBOOK:

An Introduction to Agent-Based Modeling: U. Welinsky and W. Rand

GRADE ANNOUNCEMENTS:

TBA – Due to COVID-19, this date to be announced by the Registrar’s Office

EVALUATION:

Your final course grade is determined by your performance in the components list below in the Evaluation Table (seminar, assignments, project, mid-term, and a final examination. **Students must receive a minimum of 50% on the final examination and must complete and pass all components in the course in order to be eligible to receive a passing grade.**

Each component is weighted as follows:

COMPONENT	NO	VALUE %	TOTAL VALUE	DETAILS / ADDITIONAL INFO
Seminars	1	10%	10	
Assignments	5	3%	15	
Project	1	25%	25	
Mid-Term Exam				
Final Examination	1	50%	50	
TOTAL			100	

GRADE SCALE:

LETTER	MARK	LETTER	MARK	LETTER	MARK	LETTER	MARK
A+	95-100	B+	80-84	C+	65-69	D	45-54
A	85-94	B	70-79	C	55-64	F	<45

INSTRUCTOR INFO:

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Office Hours: By appointment

VOLUNTARY WITHDRAW:

November 23, 2020

REQUIREMENTS/REGULATIONS

Student Responsibilities: It is the responsibility of each student to contact the instructor if he/she is uncertain about his/her standing in the course and his/her potential for receiving a failing grade. Students should also familiarize themselves with Sections 4 and 6 of the Regulations dealing with, among others, incomplete term work, deferred examinations, attendance and withdrawal, etc..

Lectures: Attendance at lectures is essential for successful completion of this course. Students must satisfy each evaluation component in the course.

ACADEMIC INTEGRITY

Students are expected to conduct themselves in accordance with the highest ethical standards of the Profession of Engineering and evince academic integrity in all their pursuits and activities at the university. As such, in accordance with the General Academic Regulations and Requirements of the University of Manitoba, Section 7.1, students are reminded that plagiarism* or any other form of cheating is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university) regardless of media

- examinations
- assignments
- laboratory reports
- term exams

A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty

Please refer any questions regarding Academic Integrity to your course instructor.

***Plagiarism:** to steal and pass off (the ideas or words of another) as one's own; use (another's production) without crediting the source