UM157: Logic in Action: New Introduction to Logic

Course Description

Logic provides an essential methodological framework of reasoning connecting a wide variety of disciplines in the humanities and sciences, including philosophy, mathematics, computer science, linguistics, cognitive science, and economics. This course will introduce students to logic and its applications highlighted by recent developments in these fields. We will use the open source logic course “Logic in Action” online at http://www.logicinaction.org/, which has been developed by the international team of Professor Johan van Benthem at Amsterdam, and taught in many places, including Stanford, Amsterdam, Beijing, Seville, and Ljubljana.

The course extends the standard material for introductory logic courses by highlighting contemporary development in applications of logic. Topics to be covered in the course include: propositional logic, syllogistic logic, predicate logic, modal logic, epistemic logic, dynamic epistemic logic, semantic tableau, formal proofs, propositional dynamic logic, public announcement logic, etc.

This course is developed in collaboration with instructors of "Logic in Action" in other institutions, including the University of Amsterdam and Amsterdam University College, and course materials from the existing courses will be extensively used.

Prerequisite: Honors Precalculus with Trigonometry (OM013) and consent of instructor.

Course Objectives

Through the successful completion of this course, students will:

- understand basic concepts and methods in logic and its applications
- obtain skills to critically analyze logical structures of arguments and inferences
- acquire techniques to effectively model phenomena by applying logical systems
- learn how to create and investigate their own research topics

Textbook

Logic in Action,
available at http://www.logicinaction.org/

Key Assignments

- **In class participation**: Students are expected to participate in class discussions and be a part of an active learning environment. In class participation will be evaluated in terms of attendance, participation in class activities, and occasional in-class quizzes.

- **Homework**: Homework assignments will be given as shown on the Course Schedule. Students are encouraged to work jointly on problem sets, but the names of the collaborators must be indicated on each submitted
assignment and all students should write their own assignments (for instance, students should not submit one file as a joint assignment).

- **Exams**: There will be several proctored exams for this course. All exams are cumulative, testing understanding of the material that will have been covered by the time of the exam.

- **Final Presentation Projects**: Toward the end of the semester, students will be asked to pick research topics from a list of topics provided by the instructor. During the last two weeks of the course, each student will be asked to:
  - Give an in-class presentation on the chosen topic
  - Create a problem set and the solution on the topic
  - Submit solutions to the problem sets that the other students created

**Lectures and Discussion Sections**

There will be two discussion sections per week. For each chapter, there will be some lectures that are designed to help students understand the material in the textbook. Students should prepare for discussion sections by assigned reading and lectures. Class discussion and exercises will take place on the assumption that all students have read the relevant material in advance. There also will be occasional in-class quizzes to test students' understanding of the assigned material.