

IS 709/809: Computational Methods for IS Research Spring 2016

Times: Wednesday 4:30pm – 7:00pm

Location: Sherman Hall 210

Instructor: [Nirmalya Roy](#)

Instructor's Office Location and Hours: ITE 421 Monday 1:30 – 3:00pm, or by appointment

Instructor's Email: nroy at umbc dot edu

Course Webpage: <http://mpsc.umbc.edu/is-809compmethods/>

Course Descriptions: Computational methods are inevitable tools for many facets of information systems research. These methodologies are used as fundamental tools and techniques in research and advanced practice in information systems, with particular focus on networking hardware and software technologies that deal with data and systems. Data becomes useful when it provides meaningful information through data analysis and mining, pattern recognition and learning, information extraction and visualization. System becomes useful when it meets the required end performance metrics through the governing policies and procedures and underlying models and simulations. Sophisticated data analysis and system performance measurements require a mixture of skills ranging from algorithmic foundation, data mining, machine learning, computational modeling, and information systems performance evaluation. This course covers the mixture of these skills with the goal of providing information science graduate and masters students with the ability to employ them in future research. The course is project-based, allowing students to understand the use of computational methods to pursue research objectives and interests.

Course Objectives: The purpose of this course is to provide a comprehensive foundation to apply computational research methods in solving problems in Information Systems. This course should enhance students' reasoning, problem-solving and modeling abilities, particularly in dealing with algorithmic problems. More specifically, the course has the following objectives:

- Familiarize students with the concepts and applications of computational techniques (machine learning, data science, graph theory, computational complexity, information and communication technology, operational managements etc) to solve computational problems.
- Teach students how to think and formalize problems algorithmically and experimentally.

We will not assume any background beyond high school level mathematics and familiarity with programming concepts. However, students are expected to spend time in learning the concepts in this course, many of which will be covered in details.

Course Topics:

- Algorithmic Complexity
- Information and Communication Technology
- System Modeling and Performance Measurement
- Data Science
- Machine Learning
- Applications

Course Prerequisites: IS 650 (Data Communication and Networks) or IS 733 (Data Mining) or consent of the instructor

Recommended Textbooks (Optional):

- [Introduction to Machine Learning](#), Second Edition, by Ethem Alpaydin, MIT Press, 2010 ([Amazon.com](#))
- [Fundamentals of Queueing Theory](#), 4th Ed., by Donald Gross & John F. Shortle & James M. Thompson & Carl M. Harris. John Wiley & Sons, Inc, 2008 ([Amazon.com](#))
- [Data Structures and Algorithm Analysis in C++](#) (4th Edition) by Mark Allen Weiss, Addison-Wesley, 2013 ([Amazon.com](#))

Course Requirements and Grading:

Course Participation & Class Presentation	10%
Homeworks, Quizzes & Programming Assignments	30%
1 Midterm Exam	30%
Research & Development Project	30%

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