

Course Announcement, Spring 2018 MAT 451 Mathematical Modeling

Instructor: Dieter Armbruster, Professor,
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meeting time: M/W 3:05 - 4:20 pm

place: WXLR A 104

Line number: # 25487

Prerequisite: **Linear Algebra, Differential Equations**

Mathematical Modeling is a very wide area and the material that is covered in such a class is defined by the interests of the students and the instructor. Students who registered early voted to focus the course on complex adaptive systems. Thus the course will take an interdisciplinary look at the mathematical methods used in economics, sociology, computing and information science to understand networks and behavior. We will study phenomena that involve networks, incentives, and the aggregate behavior of groups of people and the way they make decisions.

Topics:

- Graph Theory and Social Networks
- Game Theory, Network Traffic
- Network Dynamics: Population Models for Information Cascades, Selfish Routing,
- Network Dynamics: Structural Models, Small-World Phenomena, Epidemics

Textbooks:

- Networks, Crowds and Markets, Reasoning about a Highly Connected World, David Easley, Jon Kleinberg, Cambridge University Press, ISBN: 978-0-521- 19533-1
- Networks, An Introduction, M.E.J. Newman, Oxford University Press, ISMN: 978-0-19-920665-0

The Easley and Kleinberg book is written for a very wide audience and assumes in its introductory chapters very little mathematics. It extends to "advanced material" that becomes more serious applied mathematics. The book by Newman will serve as the background material on the mathematics of networks.

Target Audiences: Students in Mathematics, Physics and Engineering. The class may be accessible for students in other disciplines that are willing to accept that some material will be beyond their comprehension level at this time. Expectations for student success will be adjusted accordingly.