Athabasca University

Mathematics (MATH) 480

Mathematical Modeling I (Revision 1)

Delivery Mode:	Individualized Study
Credits:	3
Area of Study:	Science
Prerequisites:	MATH 265, MATH 266, MATH 270, and MATH 376, or equivalent courses from another university. MATH 309 is recommended, but not required.
Precluded:	None
Challenge:	MATH 480 is not available for Challenge.
Faculty:	Faculty of Science and Technology
Status:	Replaced with new revision, see the course listing for the current revision

Overview

Learn to design, construct and refine mathematical models of situations in the physical sciences, the social sciences, finance, medicine or business. Given its emphasis, the course does not present much in the way of new mathematics, but rather provides experience in using known mathematical methods in application to real-world cases. The approach is case based, and you will work through exemplary models in crystal growth, exponential growth and decay, genetics, dynamic systems, fisheries, Markov processes and game theory. You will be introduced to Voronoi diagrams, the basics of dimensional analysis, phase-plane analysis, stability analysis of fixed points and cycles, discrete random walks and aspects of game theory. The course considers both continuous and discrete models. Note that while basic computer applications, such as graphing programs, will be used, computer expertise is not required, and simulation models will be covered in a companion course, Mathematical Modeling II.

Outline

- Unit 1: Introduction to Modeling
- Unit 2: Crystallization Models and Voronoi Diagrams
- Unit 3: Dimensional Analysis and Error Analysis
- Unit 4: It’s in the Genes
- Unit 5: Growth Processes I: Continuous Models
- Unit 6: Growth Processes II: Discrete Models
- Unit 7: Model Fisheries
- Unit 8: Multi-species Interaction Models

- Unit 9: Markov Processes
- Unit 10: Game Theory

Evaluation

Evaluation

To **receive credit** for MATH 480, you must submit all of the course work and achieve a weighted average of 60% on the examinations and assignments, and an overall composite grade of at least **C— (60 percent)** .

The weighting of the composite grade is as follows:

Activity	Weight
Assignment 1	10%
Midterm Exam	30%
Assignment 2	10%
Final Essay	50%
Total	**100%**

To learn more about assignments and examinations, please refer to Athabasca University's **online Calendar** .

Materials

Materials

Illner, R., Bohun, C., McCollum, S. & van Roode, T. (2005). *Mathematical modelling: A case studies approach*. Providence RI: American Mathematical Society. (Print)

Maki, D. & Thompson,M. (2006). *Mathematical modeling and computer simulation*. New York: Thomson, Brooks/Cole. (Print)

Other Materials

The course materials include a study guide, student manual and an assignment manual.

Important Links

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- Academic Advising
- Program Planning
- Request Assistance
- Support Services

Athabasca University reserves the right to amend course outlines occasionally and without notice. Courses offered by other delivery methods may vary from their individualized-study counterparts.

Opened in Revision 1, May 5, 2010

Updated November 29, 2021, by Student & Academic Services