ROWAN UNIVERSITY
Department of Mathematics

Syllabus
Math 01.520 Topics in Applied Mathematics

CATALOG DESCRIPTION:

Math 01.520   Topics in Applied Mathematics ………………………………………………………3 S.H.

Catalog Description

This course provides an overview of the mathematical modeling process and includes applications to optimization, dynamical systems, and Stochastic process. Models of specific real world systems will be developed and studied using an analytical and numerical methods.

(Prerequisite: 1701.231, 1701.502)

Objective:

This course is intended to provide a sufficient background in linear algebra and matrix theory for students in the program of M.A. in mathematics and those in the program of M.A. in Subject Matter Teaching Mathematics.

After completing this course a student will be able to

1. construct mathematical models of real world systems

2. to describe the recursive process for the construction of mathematical models

3. to use methods of linear algebra and differential equations toward solving mathematical models.

4. to describe at least three different types of mathematical models.

5. to use statistical techniques to estimate model parameters and fit a particular model to available data

6. to evaluate the validity and robustness of a mathematical model

Contents:

1. Mathematical Models and Mathematical Modeling

• The Modeling Process, Dimensional Analysis, and Curve Fitting

2. The Mathematics of Optimization

• One-Variable and Multivariable Optimization, Sensitivity Analysis, Robustness, and Computational Methods (could include applications to transportation, economics, production control, and harvesting)

3. Dynamical Systems

• Steady State Analysis, Discrete and Continuous Time Dynamical Systems, Eigenvalue Methods, Phase Portraits, and Numerical Methods (could include applications to epidemiology, planetary motion, ecology, and traffic flow.)

4. Stochastic Processes
• Discrete and Continuous Probability Models, Markov Processes, and Monte Carlo Simulation (could include applications to inventory control, operations research, and epidemiology.)

Evaluations of Students: Students will be evaluated based on exams, and individual and/or team projects

Course Evaluation: The course will be evaluated through student surveys and faculty focus groups within the graduate mathematics program.

TEXTS:

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