Jimma University

College of natural Sciences Department of Mathematics

Course Out line for Mathematical Modeling, Math 442

Credit Hrs : 3 Tutorial : 2

Course Description

The course consists of the study of Mathematical models, Arguments from scale, Dimensional analysis, Graphical methods, Comparative statics, Optimization by differentiation and Monte Carlo simulation.

Course Objectives

The aim is to learn the basic ideas about Mathematical modeling, Graphical methods, and Monte Carlo simulation.

Course Content

CHAPTER I: Introduction

1.1 Models and reality

1.2 Properties of models

1.3 Building a model

1.4 Examples

1.5 Why study modeling

Review exercise

CHAPTER II: Arguments from scale

2.1 Effects of size

2.2 Dimensional Analysis

Review exercise

CHAPTER III: Graphical Methods

3.1 Using graphs in modeling

3.2 Comparative static

3.3 Stability questions

Review exercise

CHAPTER IV: Basic optimization

4.1 Optimization by differentiation

4.2 Graphical Methods

Review exercise

CHAPTER V: Basic probability

5.1 Analytic method

5.2 Monte Carlo simulation

5.3 Potpourri

Review exercise

Methodological Strategies

The methodologies used for the course are:

- Conducting lecture for those chapters that need clarification and elaborations
- Arrange tutorial hours
- Solve problems
- Group discussion and presentations
- Project (if appropriate)
- Reading assignment

References

1. "Mathematical Modeling" by J. Berry & K. Houston, Edward Arnold. London, 1995
2. "Higher Engineering Mathematics" by B.V. Ramana, McGrrawHill, 2008
3. "Mathematical Modeling" J.N. Kapoor, Wiley, 2000
4. Modern Differential Equations Abell and Braselton, 2nd edition, Thomson Learning