COURSE APPROVAL DOCUMENT
Southeast Missouri State University

Department: Mathematics
Title of Course: Mathematical Modeling
Course No. MA478/MA678
Date: FALL 2016
Please check: X New Revision

I. Catalog Description (Credit Hours of Course):
Introduction to mathematical descriptions of physical phenomena, computational methodologies, and empirical interpretations of numerical data. (3)

II. Co- or Prerequisite(s):
MA244 with a minimum grade of ‘C’ and MA345 with a minimum grade of ‘C’ and one of the following:
1. MA334 with a minimum grade of ‘C’
2. CS155 with a minimum grade of ‘C’
3. CS177 with a minimum grade of ‘C’

III. Purposes or Objectives of the Course (optional):
A. To acquaint students with fundamental ideas in optimization models.
B. To introduce the analytical and computational methodologies utilized in dynamic modeling.
C. To introduce discrete and continuous stochastic modeling.
D. To provide students with a basic knowledge of numerical simulations.
E. To acquire an appreciation for solving real-world problems via mathematical models.

IV. Student Learning Outcomes (Minimum of 3):
A. Students will be able to formulate a mathematical model from a real-world problem.
B. Students will be able to write a program to simulate a mathematical model.
C. Students will be able to analyze a model using mathematical techniques.

V. Optional departmental/college requirements:
A.
B.

VI. Course Content or Outline (Indicate number of class hours per unit or section):

<table>
<thead>
<tr>
<th>Topics</th>
<th>Class hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Optimization models</td>
<td>9</td>
</tr>
<tr>
<td>B. Dynamic models</td>
<td>9</td>
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<tr>
<td>C. Probability models</td>
<td>9</td>
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<tr>
<td>D. Numerical simulations</td>
<td>9</td>
</tr>
<tr>
<td>E. Exams</td>
<td>2</td>
</tr>
<tr>
<td>F. Project Presentations</td>
<td>4</td>
</tr>
<tr>
<td>G. Review</td>
<td>3</td>
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</table>

Total hours 45

Please Attach copy of class syllabus and schedule as an example

Signature: _____________________________________________ Date: _____________
Chair
Signature: _____________________________________________ Date: _____________
Dean
Instructor: Dr. Peter Oman
Office: JH 315
Office Hours: 11am-1:30pm
Phone: 573-651-2724
Email: poman@semo.edu

Prerequisites:
MA244 with a minimum grade of ‘C’ and MA345 with a minimum grade of ‘C’ and one of the following:
1. MA334 with a minimum grade of ‘C’
2. CS155 with a minimum grade of ‘C’
3. CS177 with a minimum grade of ‘C’

Textbook:

Catalog Description and Credit Hours of Course:
Introduction to mathematical descriptions of physical phenomena, computational methodologies, and empirical interpretations of numerical data. (3)

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C. To introduce discrete and continuous stochastic modeling.
D. To provide students with a basic knowledge of numerical simulations.
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Student Learning Outcomes:
A. Students will be able to formulate a mathematical model from a real-world problem.
B. Students will be able to write a program to simulate a mathematical model.
C. Students will be able to analyze a model using mathematical techniques.

Basis of Student Evaluation:

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<thead>
<tr>
<th></th>
<th>478</th>
<th>678</th>
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</thead>
<tbody>
<tr>
<td>Assignments/Projects</td>
<td>45%</td>
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</tr>
<tr>
<td>Exams</td>
<td>30%</td>
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<tr>
<td>Final Exam</td>
<td>25%</td>
<td>Final Exam</td>
</tr>
<tr>
<td>Graduate Project</td>
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<td>Graduate Project</td>
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Grades will be assigned on a 90-80-70-60 scale for undergraduates and a 90-80-70 scale for graduates.

Course Outline (Tentative):
Week 1: One-variable optimization
Week 2: One-variable optimization (continued); Multivariable optimization
Week 3: Multivariable optimization (continued)

Week 4: Numerical simulations of optimization models

Week 5: Project presentation; Review; Exam 1

Week 6: Introduction to dynamic models

Week 7: Introduction to dynamic models (continued); Analysis of dynamic models

Week 8: Analysis of dynamic models

(continued) Week 9: Numerical simulations of dynamic models

Week 10: Project presentation; Review; Exam 2

Week 11: Introduction to probability models

Week 12: Introduction to probability models (continued); Analysis of probability models

Week 13: Analysis of probability models

(continued) Week 14: Numerical simulations of probability models

Week 15: Project presentation; Review

Accessibility statement: “Any student who believes that they may need an academic accommodation based on the impact of a disability should contact me to arrange an appointment to discuss their individual needs. We instructors rely on Disability Support Services to verify the need for academic accommodations and developing accommodation strategies. Students that have not already registered with Disability Support Services as a student with a disability will be encouraged to do so.” The official information about disabilities from Learning Assistance Programs and Disability Support Services is located at http://www.semo.edu/ds/southeast_links.html

Civility statement: “Every student at Southeast Missouri State University is obligated, at all times, to assume responsibility for his or her actions, to respect constituted authority, to be truthful, and to respect the rights of others as well as respect private and public property. Students are expected to abide by the University’s Statement of Student Rights and Code of Student Conduct (Code). Alleged violations of the Code are adjudicated in accordance with the established procedures of the judicial system.” The official information about student conduct can be found at http://www.semo.edu/stuconduct/general-info.html

Academic Honesty Statement: Dishonorable actions, such as cheating will result in an immediate zero for the correlating activity. Additional unethical actions will result in a referral to the Department Chair, Dean of the College of Science and Math, and/or the University Judicial Affairs Committee. The official statement about academic honesty, including plagiarism, may be accessed at http://www.semo.edu/bulletin/

Questions: Questions, comments, or requests regarding this class should be directed to your instructor. Unanswered questions or unresolved issues involving this class may be taken to Dr. Tamela Randolph, Chairperson of the Department of Mathematics.

Updated on February 12, 2016