

PORTLAND STATE UNIVERSITY  
Department of Economics  
Fall 2009

**EC 480/580: ADVANCED MATHEMATICAL ECONOMICS**

**Professor:** Rossitza Wooster

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**Class Meetings: SH 207**

TR 2:00 pm – 3:50 pm

**Office Hours\***

W 11:30 am – 1:00 pm

\*By Appointment

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**Syllabus**

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**Prerequisites** EC 380 (or equivalently: Calculus I, II, and Linear Algebra).

**Course Description** This course presents the mathematics required for studying economics at the graduate level. Mathematical concepts are developed in the context of economics and applications are drawn from a wide range of fields in economics including microeconomics, macroeconomics, economics growth, international trade, international finance, labor and environmental economics, industrial organization and development economics. The course covers optimization (unconstrained and constrained), comparative statics, integral calculus and first order differential equations.

**Learning Objectives** This course is intended to assist students in becoming comfortable with mathematical techniques used in economic analyses at both the undergraduate and graduate level. This course is designed to accomplish the following learning objectives.

- 1) Thoroughly understand mathematical methods and concepts employed in economic models and equilibrium analysis. Mathematical techniques include, but are not limited to the use of integral calculus in economic dynamics, optimization methods, continuous time analyses, and discrete time analyses.
- 2) Competently apply mathematical methods in problems and applications that aim to analyze economic problems.

Mastering these goals will prove useful in concurrent and later courses and in future work and research. It will also provide a solid foundation that will allow graduates to provide useful analytical economic services to an employer. Finally, an understanding of mathematical economics will allow students to keep up with advances in economic science after leaving Portland State University, since they will be able to read and comprehend the articles in the leading economics journals.

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**Required Text** “*Fundamental Methods of Mathematical Economics*”, by Alpha C. Chiang and Kevin Wainwright, 4<sup>th</sup> ed., McGraw-Hill Irwin, ISBN: 0-07-010910-9.

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**Graded Components**

This course involves a significant amount of homework designed to give students plenty of “hands-on experience” with mathematical techniques covered in class. Homework assignments will require students to solve exercises and work through applications. Assignments and exams are discussed in more detail below:

1. Five homework assignments will be administered and graded throughout the quarter term (assignment with the lowest score will be dropped). Each homework assignment is worth 10% of the course grade for a total of 40% (after dropping the lowest homework grade). Homework assignments are intended to facilitate comprehension and practice with application of mathematical techniques (learning objective 1).
2. There will be a midterm and a final exam each worth 30% of the course grade. Midterm and final exams are designed to test the extent to which students have mastered the mathematical techniques, including problem solving and application of mathematical concepts to analysis of common economic problems (learning objective 2).

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**Policies**

- The exams cannot be rescheduled or made up, so do not take the course if you cannot take the exams during their scheduled times. The only exceptions to this rule are: (i) documented medical emergencies; and (ii) absence due to active military, police, and/or jury duty (need letter from the appropriate official).
  - Improving your grade through “extra work” is NOT an option in this class!
  - An *Incomplete* (letter grade “I”) or a *Withdrawal* (letter grade “W”) is not to be viewed as a substitute for a failing grade in this course (letter grade “F”).
  - Students with documented learning disabilities or special needs, must contact both the Testing Center and the course instructor at least a week in advance of scheduled exams times.
  - Class attendance is mandatory. If you miss class, it is your responsibility to find out what you missed, get notes from peers, etc.
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<b>Tentative Schedule</b>		
<b>Week</b>	<b>Topic</b>	<b>Reading</b>
<b>Week 1</b>	<ul style="list-style-type: none"> <li>◆ Optimization: A Special Type of Equilibrium Analysis</li> </ul>	Chapter 9
<b>Week 2</b>	<ul style="list-style-type: none"> <li>◆ Optimization: A Special Type of Equilibrium Analysis</li> <li>◆ Exponential and Logarithmic Functions</li> <li>◆ <b>Homework Assignment No. 1:</b> <u>Due Thursday, Oct. 8<sup>th</sup>, 2009</u></li> </ul>	Chapters 9 & 10
<b>Week 3</b>	<ul style="list-style-type: none"> <li>◆ Exponential and Logarithmic Functions</li> </ul>	Chapter 10
<b>Week 4</b>	<ul style="list-style-type: none"> <li>◆ Optimization: The Case of More than One Variable</li> <li>◆ <b>Homework Assignment No. 2:</b> <u>Due Thursday, Oct 22<sup>nd</sup>, 2009</u></li> </ul>	Chapter 11
<b>Week 5</b>	<ul style="list-style-type: none"> <li>◆ <b>Midterm Exam:</b> <u>Thursday, October 29<sup>th</sup>, 2009</u></li> <li>◆ Optimization with Equality Constraints</li> </ul>	Chapter 12
<b>Week 6</b>	<ul style="list-style-type: none"> <li>◆ Optimization with Equality Constraints (continued)</li> <li>◆ Further Topics In Optimization</li> </ul>	Chapter 12 & 13
<b>Week 7</b>	<ul style="list-style-type: none"> <li>◆ Further Topics In Optimization</li> <li>◆ <b>Homework Assignment No. 3:</b> <u>Due Tuesday, Nov. 10<sup>th</sup>, 2008</u></li> </ul>	Chapter 13
<b>Week 8</b>	<ul style="list-style-type: none"> <li>◆ Economic Dynamics and Integral Calculus</li> <li>◆ <b>Homework Assignment No. 4:</b> <u>Due Thursday, Nov. 19<sup>th</sup>, 2008</u></li> </ul>	Chapter 14
<b>Week 9</b>	<ul style="list-style-type: none"> <li>◆ Economic Dynamics and Integral Calculus</li> <li>◆ Continuous Time: First-Order Differential Equations.</li> <li>◆ <i>No Class on Thursday November 26<sup>th</sup>, 2009 – Happy Thanksgiving!</i></li> </ul>	Chapter 14 & 15
<b>Week 10</b>	<ul style="list-style-type: none"> <li>◆ Continuous Time: First-Order Differential Equations.</li> <li>◆ <b>Homework Assignment No. 5:</b> <u>Due Thursday, Dec. 3<sup>rd</sup>, 2009</u></li> </ul>	Chapter 15
<b>Finals Week</b>	<ul style="list-style-type: none"> <li>◆ <b>Final Exam:</b> <u>Monday, December 7<sup>th</sup>, 2009 (10:15 am - 12:05 pm).</u> Note: The final exam is not cumulative. All material covered since the midterm exam will be tested on the final.</li> </ul>	