Mathematics for Economists

Instructor: Hyeon Kim
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Course Description: This course will introduce mathematical language, develop the mathematical techniques of calculus and matrix algebra, and show how these techniques may be used in doing economic analysis in intermediate and advanced economic courses. Topics that will be covered include matrices; determinants and inverse matrices; comparative statics; derivatives and optimization of functions of one variable; partial derivatives, unconstrained and constrained optimization of functions of several variables.

Credit hours: 3

Prerequisite(s): There are three prerequisites: college algebra, Econ 2010 (Principles of Microeconomics) and Econ 2020 (Principles of Macroeconomics). If you didn’t take these classes or equivalent before, you are not eligible for taking this course. If you believe you took similar equivalent courses before, please let me know as soon as possible, indicating which courses you have taken.

Required Text(s): No but lecture notes (slide format) will be made available through the class webpage.

Optional Text(s):

Course Objectives: At the completion of this course, a successful student will be able to:
- have intuition for how and why the various mathematical techniques work.
- to some extent, understand mathematical language and techniques used in economic analysis such as matrix algebra, derivative, differential, optimization problems, and comparative statics.

Teaching and Learning Methods: This class will be operated by a combination of lectures, assignments, and exams. For successful completion of this course, class attendance will be an integral part of this course and reviewing class materials, solving practice questions and completing assignments will be helpful for your understanding.

Grading Assessment: The course grade will be based on participation, assignments, and exams. The official course grade will be based on the sum of points you have made on each part.

- Participation (15%): We’re supposed to have 23 classes excluding exam days and the first two weeks (Jan. 11th: last day to add and drop classes) during this semester and attendance is expected and will be taken each class. You are allowed to miss 3 classes without penalty.
but any further absences will result in point deductions. In addition **more than 10 absences will lead to zero points.**

- **Assignments (35%):** There will be three assignments and each assignment will be based on three levels: minimum, intermediate and challenging questions. Please see the course outline and schedule for dates of assignments.

- **Exams (50%):** There will be three in-class exams, two midterms (15 points each) and final exam (20 points). Detailed instructions will be posted later on Canvas.

**Letter Grade Distribution:**

- Tentative grading scale is: A range $\geq 90$; B range $\geq 75$; C range $\geq 60$; D range $\geq 50$.
- It might be adjusted based on class performance.
- For instance, the following distribution was used for the Spring 2018 semester.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Minimum Score</th>
<th>Intermediate Score</th>
<th>Challenging Score</th>
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<tbody>
<tr>
<td>A</td>
<td>$\geq 92.0$</td>
<td>72.0 - 77.9</td>
<td>B-</td>
</tr>
<tr>
<td>A-</td>
<td>89.0 - 91.9</td>
<td>66.0 - 71.9</td>
<td>C+</td>
</tr>
<tr>
<td>B+</td>
<td>84.0 - 88.9</td>
<td>60.0 - 65.9</td>
<td>C</td>
</tr>
<tr>
<td>B</td>
<td>78.0 - 83.9</td>
<td>55.0 - 59.9</td>
<td>D-</td>
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<tr>
<td>D+</td>
<td>50.0 - 54.9</td>
<td>45.0 - 49.9</td>
<td>D</td>
</tr>
<tr>
<td>D</td>
<td>45.0 - 49.9</td>
<td>40.0 - 44.9</td>
<td>&lt;40.0</td>
</tr>
<tr>
<td>B-</td>
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<td>35.0 - 39.9</td>
<td>E</td>
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<tr>
<td>C+</td>
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<td>30.0 - 34.9</td>
<td>C</td>
</tr>
<tr>
<td>C</td>
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<td>25.0 - 29.9</td>
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<tr>
<td>B</td>
<td>25.0 - 29.9</td>
<td>20.0 - 24.9</td>
<td>A</td>
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<tr>
<td>B+</td>
<td>20.0 - 24.9</td>
<td>15.0 - 19.9</td>
<td>A-</td>
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<tr>
<td>A-</td>
<td>15.0 - 19.9</td>
<td>10.0 - 14.9</td>
<td>B</td>
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<tr>
<td>D</td>
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<td>5.0 - 9.9</td>
<td>D+</td>
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<td>D+</td>
<td>5.0 - 9.9</td>
<td>&lt;5.0</td>
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**Course Policies:**

- Please avoid using electronic devices for non-class related activities during class time.
- Important information will be announced via Canvas. You will need check your email address linked to CANVAS. Usually, I will reply to emails/Canvas messages within 24 hours.
- Assignments and exams will be graded within 24 hours of the date they are submitted or taken.
- No makeup exams will be given unless absence is due to a documented medical/family emergency or a previously approved excused absence.
- No late submission of assignments will be accepted without an agreed prior extension from the instructor.
- The Mark "I" (incomplete) will be given only for work incomplete because of circumstances beyond the student’s control such as medical reasons or family emergency. An "I" should be used in a way that will permit a student to retake the course without paying tuition.
- For the assignments, discussion amongst students (groups) is encouraged, but when in doubt, direct your questions to the instructor.

**Academic Policies:**

- **Faculty and Student Responsibilities:** All students are expected to maintain professional behavior in the classroom setting, according to the Student Code, spelled out in the Student Handbook. Students have specific rights in the classroom as detailed in Article III of the Code. The Code also specifies proscribed conduct (Article XI) that involves cheating on tests, plagiarism, and/or collusion, as well as fraud, theft, etc. Students should read the Code carefully and know they are responsible for the content. According to Faculty Rules and Regulations, it is faculty responsibility to enforce responsible classroom behaviors, beginning with verbal warnings and progressing to dismissal from class and a failing grade. Students have the right to appeal such action to the Student Behavior Committee.
• In particular, you should be mindful of the **Academic misconduct** defined in the Academic Policies such as cheating, misrepresenting one’s work, plagiarism, inappropriately collaborating, fabrication and so on. **Cheating on the exams** (or other forms of academic dishonesty) may lead to failure of class (or expulsion from the class). For the assignments, discussion amongst students (groups) is encouraged but **copies and exact duplicates are unacceptable**. If you are found responsible for misconduct (e.g. offering and accepting solutions from others), all involved parties will be penalized.

• **Wellness statement**: Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc., can interfere with a student’s ability to succeed and thrive at the University of Utah. For helpful resources contact the Center for Student Wellness at [www.wellness.utah.edu](http://www.wellness.utah.edu) or 801-581-7776.

• **Addressing Sexual Misconduct**: Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran’s status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677 (COPS).

• **The Americans with Disabilities Act**: The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you will need accommodations in this class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, 801-581-5020. CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in an alternative format with prior notification to the Center for Disability Services.

• **Student Names & Personal Pronouns statement**: Class rosters are provided to the instructor with the student’s legal name as well as “Preferred first name” (if previously entered by you in the Student Profile section of your CIS account). While CIS refers to this as merely a preference, I will honor you by referring to you with the name and pronoun that feels best for you in class, on papers, exams, group projects, etc. Please advise me of any name or pronoun changes (and update CIS) so I can help create a learning environment in which you, your name, and your pronoun will be respected. If you need assistance getting your preferred name on your UIDCard, please visit the LGBT Resource Center Room 409 in the Olpin Union Building, or email bpeacock@sa.utah.edu to schedule a time to drop by. The LGBT Resource Center hours are M-F 8am-5pm, and 8am-6pm on Tuesdays.
### Tentative Course Outline and Schedule

<table>
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<tr>
<th>Week</th>
<th>Topic</th>
<th>Reading Assignment</th>
<th>Note</th>
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</table>
| 01 (01/08, 10) | Introduction to the Course  
The Nature of Mathematical Economics  
Economic Models | FMME Chs. 1-2     |            |
| 02 (01/15, 17) | Equilibrium Analysis in Economics  
Linear Models and Matrix Algebra | FMME Chs. 3-5     |            |
| 03 (01/22, 24) | Review  
Linear Models and Matrix Algebra | EMEA Chs. 15-16   |            |
| 04 (01/29, 31) | Linear Models and Matrix Algebra  
Review  
Equilibrium Analysis in Economics |            |            |
| 05 (02/05, 07) | 1st Midterm  
Concept of Derivative |            |            |
| 06 (02/12, 14) | 1st Midterm  
Concept of Derivative  
Rules of Differentiation |            |            |
| 07 (02/19, 21) | Review/ 2nd Midterm  
Review  
Concept of Derivative  
Rules of Differentiation |            |            |
| 08 (02/26, 28) | 2nd Midterm  
Rules of Differentiation |            |            |
| 09 (03/05, 07) | Comparative Statics  
Concept of Derivative  
Rules of Differentiation |            |            |
| 10 (03/12, 14) | No Classes  
Spring Break |            |            |
| 11 (03/19, 21) | Comparative Statics | FMME Ch. 8  
EMEA Ch. 12 |            |
| 12 (03/26, 28) | Review/ 2nd Midterm  
Review  
Concept of Derivative  
Rules of Differentiation |            |            |
| 13 (04/02, 04) | Optimization Problems  
Rules of Differentiation | FMME Chs. 9, 11, & 12  
EMEA Chs. 8, 13, & 14 |            |
| 14 (04/09, 11) | Optimization Problems |            |            |
| 15 (04/16, 18) | Optimization Problems  
Rules of Differentiation |            |            |
| 16 (04/23) | Review |            |            |
| 17 (05/01) | Final Exam (10:30 am - 12:30 pm) |            |            |

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<th>Assignment</th>
<th>Chapters</th>
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<table>
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<td>02/12</td>
<td>2nd Mid</td>
<td>6, 7, &amp; 8</td>
<td>15</td>
<td>03/28</td>
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<td>05/01</td>
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**Important Dates:**
- Friday, Jan. 11th: Last day to add, drop, audit, and elect CR/NC
- Friday, Feb 1st: Last day to withdraw from classes

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1I reserve the right to make such alterations to this tentative schedule as circumstances may warrant.