**Course Information**

Fall 2019 (Aug 19, 2019 - Dec 07, 2019)  
MWF 2:30 pm - 3:20 pm  
Krannert Building G013  
Course Credits: 3.000

**Instructor**

Lead Instructor: Jixuan (Edie) Yao  
Office: KRAN 779  
Phone: (607) 379-5691  
Email: yao149@purdue.edu  
Office Hours: Wed Thu 3:30 - 4:30pm @ KRAN 779

**Course description**

This course covers introductory level mathematics for graduate students in Agricultural and Applied Economics. The goal is to provide students with a set of mathematical tools to support graduate coursework in microeconomics, macroeconomics, linear programming, and econometrics. This course pursues practical use of mathematics in economics rather than a rigorous treatment of mathematics itself. We will cover the basics of calculus, matrix algebra, optimization theory, and statistics, emphasizing applications to applied problems.

**Learning outcomes**

In completing the course, students will:

- use mathematical tools of calculus and matrix algebra in conducting the corresponding calculations, operations and derivations;
- be able to solve constraint optimization problems with complete mathematical steps using Lagrangian method, and conduct comparative statics analysis;
- build the foundations of probability and statistics for future economic study.

**Learning resources & texts**

No textbook is required for this course. However, many books are helpful to understanding the concepts and can provide valuable supplemental resources to the class lectures:

• Don't be afraid or embarrassed to use online resources such as Google, Wikipedia, Wolfram Alpha, MathIsFun or PurpleMathtake any resource you have available to you!

Assignments (Course requirements)

The grade for this course will be based on homework assignments, class participation, self-designed quizzes, and three exams. Semester grades will be determined according to the following weights:

<table>
<thead>
<tr>
<th>Assignments</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation and quizzes</td>
<td>10</td>
</tr>
<tr>
<td>Homework</td>
<td>20</td>
</tr>
<tr>
<td>Midterm 1</td>
<td>20</td>
</tr>
<tr>
<td>Midterm 2</td>
<td>20</td>
</tr>
<tr>
<td>Final</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
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</table>

• Homework will be assigned on a weekly basis and must be turned in at the beginning of the class on the due date. Late submission without prior approval of the instructor will receive a 25% penalty. Papers turned in after corrected papers have been distributed will be marked, but no credit will be given.
• Group-work is encouraged and expected. Explaining problem solutions to your peers is one of the best ways to improve your own understanding. However, each homework needs to be completed and submitted individually.
• The tentative dates for the midterms are **Friday, Sep. 27th**, and **Friday, Nov. 1st**, during the regular class period. The date, time and location of the final exam will be announced by the University. While the exams are not strictly cumulative in nature, many of the skills required on the midterm will be useful in completing the final. A make-up exam will not be given unless there is a documented university approved absence.
• Regular attendance is expected. Each student is required to sign up for designing a quiz for the rest of the cohort. The contents of the quizzes need to be related to recent topics taught in class. Anyone who has a quiz idea needs to talk with the instructor and formalize the question beforehand. Each quiz takes no more than 8 minutes to solve. **The quizzes will not be collected nor graded**, but the student who designed the quiz will show and explain a complete solution to the class; and this will be accounted for participation credits. It is a good opportunity for students to link course contents with their research interest, express a complete and clear solution of a mathematical/economic question, and experience how an exam style question is designed.

Policies

• My primary out-of-class method of communication will be via email to your Purdue email address. It is your responsibility to check for email on a regular basis. I recommend checking your Purdue email account at least every 24 hours.
• Students are responsible for either printing out the lecture notes or bringing notebooks (or digital devices) to take notes.

Grading scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Range</th>
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<tbody>
<tr>
<td>A+</td>
<td>97 - 100% of points</td>
</tr>
<tr>
<td>A</td>
<td>94 - 96% of points</td>
</tr>
</tbody>
</table>
A- 90 - 93% of points
B+ 87 - 89% of points
B 84 - 86% of points
B- 80 - 83% of points
C+ 77 - 79% of points
C 74 - 76% of points
C- 70 - 73% of points
D+ 67 - 69% of points
D 64 - 66% of points
D- 60 - 63% of points

**Academic Dishonesty**

Purdue prohibits "dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty." [Part 5, Section III-B-2-a, University Regulations] Furthermore, the University Senate has stipulated that "the commitment of acts of cheating, lying, and deceit in any of their diverse forms (such as the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest." [University Senate Document 72-18, December 15, 1972]

Please review the following resource page on plagiarism:
http://www.education.purdue.edu/discovery/research_integrity.html.

You may also want to refer students to Purdue's student guide for academic integrity:
https://www.purdue.edu/odos/academic-integrity

The Purdue Honor Pledge:
“As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue”

**Copyright materials**

Students are expected, within the context of the Regulations Governing Student Conduct and other applicable University policies, to act responsibly and ethically by applying the appropriate exception under the Copyright Act to the use of copyrighted works in their activities and studies. The University does not assume legal responsibility for violations of copyright law by students who are not employees of the University.

A Copyrightable Work created by any person subject to this policy primarily to express and preserve scholarship as evidence of academic advancement or academic accomplishment. Such works may include, but are not limited to, scholarly publications, journal articles, research bulletins, monographs, books, plays, poems, musical compositions and other works of artistic imagination, and works of students created in the course of their education, such as exams, projects, theses or dissertations, papers and articles.

You may want to refer students to the University Regulations on policies:
http://www.purdue.edu/policies/academic-research-affairs/ia3.html

**Attendance**
Students are expected to be present for every meeting of the classes in which they are enrolled. Only the instructor can excuse a student from a course requirement or responsibility. When conflicts or absences can be anticipated, such as for many University sponsored activities and religious observations, the student should inform the instructor of the situation as far in advance as possible…For unanticipated or emergency absences when advance notification to an instructor is not possible, the student should contact the instructor as soon as possible by email, or by contacting the main office that offers the course. When the student is unable to make direct contact with the instructor and is unable to leave word with the instructor’s department because of circumstances beyond the student’s control, and in cases of bereavement, the student or the student’s representative should contact the Office of the Dean of Students.

The link to the complete policy and implications can be found at: http://www.purdue.edu/studentregulations/regulations_procedures/classes.html

**Grief absence policy for students**

Purdue University recognizes that a time of bereavement is very difficult for a student. The University therefore provides the following rights to students facing the loss of a family member through the Grief Absence Policy for Students (GAPS). GAPS Policy: Students will be excused for funeral leave and given the opportunity to earn equivalent credit and to demonstrate evidence of meeting the learning outcomes for missed assignments or assessments in the event of the death of a member of the student’s family.

See the University’s website for additional information: http://www.purdue.edu/studentregulations/regulations_procedures/classes.html

**Violent behavior policy**

Purdue University is committed to providing a safe and secure campus environment for members of the university community. Purdue strives to create an educational environment for students and a work environment for employees that promote educational and career goals. Violent Behavior impedes such goals. Therefore, Violent Behavior is prohibited in or on any University Facility or while participating in any university activity.

See the University’s website for additional information: http://www.purdue.edu/policies/facilities-safety/iva3.html

**Emergency Statement**

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor’s control. Relevant changes to this course will be posted onto the course website or can be obtained by contacting the instructors or TAs via email or phone. You are expected to read your @purdue.edu email on a frequent basis.

**Accessibility and Accommodations**

Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247.
Diversity and Inclusion Statement

Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life.

Purdue University views, evaluates, and treats all persons in any University related activity or circumstance in which they may be involved, solely as individuals on the basis of their own personal abilities, qualifications, and other relevant characteristics.

Purdue University prohibits discrimination against any member of the University community on the basis of race, religion, color, sex, age, national origin or ancestry, genetic information, marital status, parental status, sexual orientation, gender identity and expression, disability, or status as a veteran. The University will conduct its programs, services and activities consistent with applicable federal, state and local laws, regulations and orders and in conformance with the procedures and limitations as set forth in Purdue’s Equal Opportunity, Equal Access and Affirmative Action policy which provides specific contractual rights and remedies. Additionally, the University promotes the full realization of equal employment opportunity for women, minorities, persons with disabilities and veterans through its affirmative action program.

Any question of interpretation regarding this Nondiscrimination Policy Statement shall be referred to the Vice President for Ethics and Compliance for final determination.

You may want to refer students to Purdue’s nondiscrimination statement: http://www.purdue.edu/purdue/ea_eou_statement.html

Mental Health Statement

- **If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try WellTrack, https://purdue.welltrack.com/.** Sign in and find information and tools at your fingertips, available to you at any time.
- **If you need support and information about options and resources**, please see the Office of the Dean of Students, http://www.purdue.edu/odos, for drop-in hours (M-F, 8 am- 5 pm).
- **If you’re struggling and need mental health services:** Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at (765)494-6995 and http://www.purdue.edu/caps/ during and after hours, on weekends and holidays, or by going to the CAPS office of the second floor of the Purdue University Student Health Center (PUSH) during business hours.

Course Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>Assignments</th>
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<tbody>
<tr>
<td>Week 1</td>
<td>Review of basic algebra</td>
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<tr>
<td>Week 2</td>
<td>Calculus I (single variable)</td>
<td>Homework 1</td>
</tr>
<tr>
<td>Week 3</td>
<td>Calculus II (multiple variables)</td>
<td>Homework 2</td>
</tr>
<tr>
<td>Week 4</td>
<td>Calculus III (integration)</td>
<td>Homework 3</td>
</tr>
<tr>
<td>Week 5</td>
<td>Matrix Algebra I (vectors and matrices)</td>
<td>Homework 4</td>
</tr>
<tr>
<td>Week 6</td>
<td>Matrix Algebra II (determinant and inverse matrix)</td>
<td>Midterm 1: Calculus</td>
</tr>
<tr>
<td>Week 7</td>
<td>Solving System of Linear Equations</td>
<td>Homework 5</td>
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<tr>
<td>Week 8</td>
<td>Matrix Algebra III (gradient, Jacobian and Hessian)</td>
<td>Homework 6</td>
</tr>
<tr>
<td>Week 9</td>
<td>Matrix Algebra IV (definiteness)</td>
<td>Homework 7</td>
</tr>
<tr>
<td>Week 10</td>
<td>Optimization I (single variable)</td>
<td>Homework 8</td>
</tr>
<tr>
<td>Week 11</td>
<td>Optimization II (multiple variables)</td>
<td>Midterm 2: Matrix Algebra</td>
</tr>
<tr>
<td>Week 12</td>
<td>Optimization III (with equality constraints)</td>
<td>Homework 9</td>
</tr>
<tr>
<td>Week 13</td>
<td>Comparative statics (Envelope Theorem and IFT)</td>
<td>Homework 10</td>
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<tr>
<td>Week 14</td>
<td>Probability and Statistics I (univariate random variable)</td>
<td>Homework 11</td>
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<tr>
<td>Week 15</td>
<td>Thanksgiving break</td>
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<tr>
<td>Week 16</td>
<td>Probability and Statistics II (multivariate random variables)</td>
<td>Homework 12</td>
</tr>
</tbody>
</table>

* Schedule and assignments subject to change. Any changes will be posted in Blackboard

**Course Evaluation**

During the last two weeks of the course, you will be provided with an opportunity to evaluate this course and your instructor. Purdue now uses an online course evaluation system. You will receive an official email from evaluation administrators with a link to the online evaluation site. You will have up to two weeks to complete this evaluation. Your participation is an integral part of this course, and your feedback is vital to improving education at Purdue University. I strongly urge you to participate in the evaluation system.

**Disclaimer**

*This syllabus is subject to change.*