Course Description:
This is a continuation of Mathematical Economics I, where we discussed the essential mathematical background for studying Economics: economic models and equilibrium analysis, basic techniques of calculus including application in comparative statics, unconstrained and constrained optimization, and their applications to resource allocation problems. This course focuses on (i) tools of linear algebra to address topics introduced in Econ 387 again in \( n \)-dimensional space and (ii) mathematical techniques used in macroeconomic growth and dynamic models.

Course Learning Outcomes:
This course introduces students to the application of mathematical methods in economic theory. It builds on topics introduced and partially analyzed in Econ 387.
By the end of the course students are supposed to be able to use economics models

1. to perform static equilibrium analysis and comparative statics analysis in \( n \)-dimensional linear models using tools of linear algebra (this involves review of matrices, matrix operations, determinants and their rules, Cramer’s rule, Jacobian determinant, implicit differentiation for multiple equations, comparative statics of general function models);
2. to perform multi-variable optimization, and introduce concepts of convexity and concavity;
3. to perform constrained optimization, and introduce concepts of quasiconvexity and quasiconcavity;
4. to use concept of integrals, and use of integration;
5. to perform dynamic analysis on economic problems described by the first – order differential equations, both linear and nonlinear; with applications in economic growth models, and natural resource models;
6. to perform dynamic analysis on economic problems that involve higher order differential equations;
7. to perform dynamic analysis on economic problems with simultaneous differential equations.

Course Outline:

<table>
<thead>
<tr>
<th>Part I</th>
<th>Hours</th>
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<tbody>
<tr>
<td>1. Introduction to Mathematical Economics and Review</td>
<td>1</td>
</tr>
<tr>
<td>2. Linear Models and Matrix Algebra</td>
<td>4</td>
</tr>
<tr>
<td>Ch 4 - 5</td>
<td>Review of Matrices, Matrix Operations, Multiplications, Transpose,</td>
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</tbody>
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3. Extensions  
Jacobian determinants, Implicit Differentiation for Multiple Equations, Comparative Statics of General Function Models

Part II

4. Multivariable Optimization  
Ch 11  Definiteness, Objective Functions with more than Two variables

5. Optimization with Equality Constraints  
Ch 12  Extension to Econ 387, \( n \)-variable and Multiconstraint cases, Second-order Conditions, Quasiconcavity and Quasiconvexity, Applications

Part III  
Dynamic Analysis

6. First-order Differential Equations  
Ch 15

7. Higher-order Differential Equations  
Ch 16

8. Simultaneous Differential Equations (if time permits)

Prerequisites/corequisites:
Economics 387, Mathematics 211.

Required Textbook(s):

Books on Reserve:

Desire2Learn:
This course will make use of the Desire2Learn (D2L) platform. Students who are registered in the course can log on at [http://d2l.ucalgary.ca](http://d2l.ucalgary.ca) through their student centre. Please note that D2L features a class e-mail list that may be used to distribute course-related information. These e-mails go to your University of Calgary e-mail addresses only.

Tutorials:
Students are expected to attend the bi-weekly tutorial section, date will be determined. During the tutorials, the TA will discuss pre-assigned questions and additional material relevant to the course that is not covered in lectures.
Grade Determination and Final Examination Details:

<table>
<thead>
<tr>
<th>Component</th>
<th>Grade</th>
<th>Due Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 assignments</td>
<td>20%</td>
<td>Jan 27, Feb 12, March 9, March 27, and April 15, 2020.</td>
</tr>
<tr>
<td>4 best count</td>
<td>5%</td>
<td>45%</td>
</tr>
<tr>
<td>2 tests</td>
<td>35%</td>
<td>In class: Jan 29, Feb 14, March 11, March 30, 2020.</td>
</tr>
</tbody>
</table>

The official grading system will be used. See [http://www.ucalgary.ca/pubs/calendar/current/f-1-1.html](http://www.ucalgary.ca/pubs/calendar/current/f-1-1.html).

A passing grade on any particular component of the course is not required for a student to pass the course as a whole.

If a student’s letter grade on the final exam exceeds their midterm(s) letter grade, the weight of the midterm(s) is (are) transferred to the final exam. The student must have written the midterm(s) or provided supporting documentation for the absence(s) such as a medical note or statutory declaration.

As per the Writing Across the Curriculum Statement in the Calendar, writing and grading thereof will be a factor in the evaluation of student work. See [https://www.ucalgary.ca/pubs/calendar/current/e-2.html](https://www.ucalgary.ca/pubs/calendar/current/e-2.html).

Any student work which remains undistributed after the last day of classes will be available to students through the instructor’s office during the instructor’s office hours.

The final examination will be comprehensive, scheduled by the Registrar, held in a classroom, and last 2 hours. If a student cannot write their final exam on the date assigned by the Registrar’s Office, they need to apply for a deferred exam [https://www.ucalgary.ca/pubs/calendar/current/g-6.html](https://www.ucalgary.ca/pubs/calendar/current/g-6.html). Under no circumstance will this be accommodated by the Department.

Tests and exams WILL NOT involve multiple choice questions.

Programmable calculators, cellphones, textbooks, course notes, and other electronic devices will not be allowed during the writing of tests or final examinations. Students are reminded that simply being able to access their cellphone during an exam is academic misconduct.

THERE WILL BE NO MAKEUP OR DEFERRED QUIZZES/TESTS/EXAMS under any circumstances, nor may the quizzes/tests/exams be written early. Students unable to write the quizzes/tests/exams because of documented illness, family emergency, religious observance, or university-sanctioned event will have the weight shifted to the final examination; otherwise a grade of zero will be assigned.

Reappraisal of Grades and Intellectual Honesty:

For Reappraisal of Graded Term Work, see Calendar I.2 [http://www.ucalgary.ca/pubs/calendar/current/i-2.html](http://www.ucalgary.ca/pubs/calendar/current/i-2.html)

For Reappraisal of Final Grade, see Calendar I.3 [http://www.ucalgary.ca/pubs/calendar/current/i-3.html](http://www.ucalgary.ca/pubs/calendar/current/i-3.html)
Statement of Intellectual Honesty, see Calendar K.4
http://www.ucalgary.ca/pubs/calendar/current/k-4.html

Plagiarism and Other Academic Misconduct, see Calendar K.5
http://www.ucalgary.ca/pubs/calendar/current/k-5.html

**Academic Accommodations:**
Students seeking an accommodation based on disability or medical concerns should contact Student Accessibility Services. SAS will process the request and issue letters of accommodation to instructors. Students who require an accommodation in relation to their coursework based on a protected ground other than disability should communicate this need in writing to their Instructor. The full policy on Student Accommodations is available at http://www.ucalgary.ca/policies/files/policies/student-accommodation-policy.pdf.

**Freedom of Information and Protection of Privacy (FOIP) Act:**
Personal information is collected in accordance with FOIP. Assignments can only be returned to the student and will be accessible only to authorized faculty and staff. For more information, see http://www.ucalgary.ca/legalservices/files/legalservices/faq-students.pdf and http://www.ucalgary.ca/legalservices/files/legalservices/faq-faculty_0.pdf.

**Internet and Electronic Communication Device information:**
The use of cell phones for any purpose in class is prohibited. Computers and tablets may be used for note taking only unless otherwise authorized by the instructor.

**Copyright Legislation:**
See the University of Calgary policy on Acceptable Use of Material Protected by Copyright at www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright.pdf. Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Policy.

**Recording of Lectures:**
Recording of lectures is prohibited, except for audio recordings authorized as an accommodation by SAS or an audio recording for individual private study and only with the written permission of the instructor. Any unauthorized electronic or mechanical recording of lectures, their transcription, copying, or distribution, constitutes academic misconduct. See https://www.ucalgary.ca/pubs/calendar/current/e-6.html.

**Important Dates:**
Please check: http://www.ucalgary.ca/pubs/calendar/current/academic-schedule.html.

**Student Organizations:**
Faculty of Arts Students’ Association (F.A.S.A.):
   Economics Department Representative
   Office: SS 803, E-mail: econrep@fasaucalgary.ca and Web: www.fasaucalgary.ca

Society of Undergraduates in Economics:
https://www.ucalgarysue.com/

Society of Undergraduates in Economics is a student run organization whose main purpose is to assist undergraduate economics students to succeed both academically and socially at the University of Calgary. Services include access to the exam bank, career events such as Industry Night and information
sessions, mentorship programs, and social events for members. They invite you to join by contacting SUE at societyofundergradsineconomics@gmail.com.

Faculty of Arts Program Advising and Student Information Resources:

- Have a question, but not sure where to start? The Arts Students’ Centre is your information resource for everything in Arts! Drop in at SS102, call them at 403-220-3580, or email them at artsads@ucalgary.ca. You can also visit the Faculty of Arts website at http://arts.ucalgary.ca/undergraduate, which has detailed information on common academic concerns, including program planning and advice.
- For registration (add/drop/swap), paying fees and assistance with your Student Centre, contact Enrolment Services at 403-210-ROCK [7625] or visit them in the MacKimmie Library Block.

Student Support and Resources:

- See https://www.ucalgary.ca/registrar/registration/course-outlines for information on campus mental health resources, the Student Ombuds’ Office, Student Success Centre, Safewalk, and Emergency Evacuation and Assembly.
- Online writing resources are available at https://ucalgary.ca/student-services/student-success/writing-support.

Notes:
1. Students are responsible for all assigned material, e.g., supplementary material posted on D2L, regardless of whether or not the material was covered in class.

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2019 – 11 – 19