湖北工業大學
HUBEI UNIVERSITY OF TECHNOLOGY

Course Title	Mathematics for Economists
Course Code	ECON 2461
Semester	Summer 2025
Course Length	5 Weeks, 60 Contact Hours
Credits	4
Instructor	TBA
Office	TBA
Email	TBA
Prerequisite	ECON 2211 Intermediate Microeconomics; First-Year Calculus Course

Course Description:

Modern economics is based on mathematics to a great extent. The course consists of three parts. Firstly, we introduce some concepts from linear algebra. The second part is devoted to multivariate calculus and constrained static optimization. The last section introduces differential equations and dynamic systems. The course uses a wide range of economic applications to illustrate and motivate all the covered mathematical techniques.

Course Goals:

Students who successfully complete this course will demonstrate competency in the following general education core goals:

- **Critical thinking skills** – Students will engage in creative and/or innovative thinking, and/or inquiry, analysis, evaluation, synthesis of information, organizing concepts, and constructing solutions.
- **Communication skills** – Students will demonstrate effective written, oral, and visual communication.
- **Teamwork** – Students will demonstrate the ability to work effectively with others to support a shared purpose or goal and consider different points of view.
- **Social responsibility** – Students will demonstrate intercultural competency and civic knowledge by engaging effectively in local, regional, national, and global communities.

Student Learning Outcomes:

Upon completion of this course, students will be able to:

- solve systems of linear equations using the substitution method, the elimination by addition method, Gauss-Jordan elimination, the matrix inverse method, and Cramer's rule;
- differentiate functions using various differentiation rules (sum, difference, quotient, and chain rule);
- do partial derivatives and do implicit differentiation;
- identify and characterize extreme values of one-variable and multivariable functions.

Textbooks/Supplies/Materials/Equipment/ Technology or Technical Requirements:
Carl P Simon & Lawrence Blume: *Mathematics for Economists*, W. W. Norton 1994.

Course Requirements:

Participation
Class participation is encouraged and will be assessed through in-class problem-solving, discussions, and engagement with course material.

Quizzes
Periodic quizzes will be given to assess students' comprehension of key concepts and reinforce learning. These quizzes may be announced or unannounced and will focus on recently covered material.

Homework Assignments
There will be 6 homework assignments throughout the semester, covering problem sets related to optimization, linear algebra, differential equations, and economic applications. Assignments will require both theoretical problem-solving and computational applications. Late submissions will be penalized unless prior arrangements have been made.

Midterm Exam
The midterm exam will be administered during the middle of the semester and will assess students' understanding of optimization and linear algebra topics covered in the first half of the course. The exam will consist of both theoretical problems and applied mathematical exercises.

Final Exam
The final exam will be cumulative, covering all topics from the course, with a focus on dynamic analysis, differential equations, and economic applications. The exam will be a combination of multiple-choice questions, short-answer theoretical questions, and mathematical problem-solving exercises. It will assess students' ability to apply mathematical methods to economic problems.

Assessments: Activity	**Percent Contribution**
Participation	10%
Quizzes	15%
Homework Assignments	20%
Midterm Exam	20%
Final Exam	35%

Grading:

Final grades will be based on the sum of all possible course points as noted above.

Percentage of available points	**Grade**
90 - 100	A
80 - 89	B
70 - 79	C
60 - 69	D
＜60	F

Course Schedule:
The schedule of activities is subject to change at the reasonable discretion of the instructor. Minor changes will be announced in class, and major ones provided in writing.

ECON 2461 Schedule

Lecture	Topic	Readings/ Activities
L1	Syllabus overview Course introduction	/
L2	Linear algebra Linear systems	Ch. 6
L3	Matrix algebra	Ch. 8
L4	Determinants	Ch. 9
L5	Inner product and norm Cramer's rule	Ch. 9
L6	Linear independence and basis Vector spaces	Ch. 11 **HW 1 Due**
L7	Multivariate calculus and optimization Open sets, closed sets, compact sets	Ch. 12
L8	Calculus (gradients, total derivatives, directional derivatives)	Ch. 14
L9	Implicit function theorem	Ch. 7
L10	Quadratic forms	Ch. 16
L11	Unconstrained optimization Economic applications	Ch. 17
L12	Constrained Optimization Optimization with linear equality constraint(s).	Ch. 18 **HW 2 Due**
L13	Method of substitution Lagrange multiplier method	Ch. 18
L14	Envelope theorem Interpretation of Lagrange multiplier Optimization with nonlinear equality constraint(s)	Ch. 19
L15	Optimization with inequality constraint(s) Kuhn-Tucker conditions and sufficiency theorem	Ch. 18 **HW 3 Due**
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L16	Comparative statics Comparative statics using implicit function and total differential Economic applications	Ch. 23
L17	Dynamic analysis	Ch. 23
L18	Integration Economic applications	Ch. 23

L19	First-order ordinary differential equations	Ch. 24
L20	Second-order ordinary differential equations	Ch. 24
		HW 4 Due
L21	Eigenvalues and eigenvectors	Ch. 23
L22	Systems of differential equations	Ch. 25
		HW 5 Due
L23	Stability	Ch. 24
L24	Phase diagrams and phase portraits	Ch. 24
L25	Linearization of nonlinear ordinary differential equations	Ch. 25
		HW 6 Due
---	**Final Exam** Covers all material from the course	/

Accommodation Statement:

Academic accommodations may be made for any student who notifies the instructor of the need for an accommodation. It is imperative that you take the initiative to bring such needs to the instructor's attention, as he/she is not legally permitted to inquire. Students who may require assistance in emergency evacuations should contact the instructor as to the most appropriate procedures to follow.

Academic Integrity Statement

Each student is expected to maintain the highest standards of honesty and integrity in academic and professional matters. The University reserves the right to take disciplinary action, up to and including dismissal, against any student who is found guilty of academic dishonesty or otherwise fails to meet the standards. Any student judged to have engaged in academic dishonesty in coursework may receive a reduced or failing grade for the work in question and/or for the course.

Academic dishonesty includes, but is not limited to, dishonesty in quizzes, tests, or assignments; claiming credit for work not done or done by others; hindering the academic work of other students; misrepresenting academic or professional qualifications within or without the University; and nondisclosure or misrepresentation in filling out applications or other University records.

Other Items:

Attendance and Expectations

All students are required to attend every class, except in cases of illness, serious family concerns, or other major problems. We expect that students will arrive on time, be prepared to listen and participate as appropriate, and stay for the duration of a meeting rather than drift in or out casually. In short, we anticipate that students will show professors and fellow students maximum consideration by minimizing the disturbances that cause interruptions in the learning process. This means that punctuality is a must, that cellular phones be turned off, and that courtesy is the guiding principle in all exchanges among students and faculty. You will be responsible for the materials and ideas presented in the lecture.

Assignment Due Dates

All written assignments must be turned in at the time specified. Late assignments will not be accepted unless prior information has been obtained from the instructor. If you believe you have extenuating circumstances, please contact the instructor as soon as possible.

Make-Up Work
The instructor will not provide students with class information or make-up assignments/quizzes/exams missed due to an unexcused absence. Absences will be excused and assignments/quizzes/exams may be made up only with written documentation of an authorized absence. Every effort should be made to avoid scheduling appointments during class. An excused student is responsible for requesting any missed information from the instructor and setting up any necessary appointments outside of class.

Access, Special Needs and Disabilities
Please notify the instructor at the start of the semester if you have any documented disabilities, a medical issue, or any special circumstances that require attention, and the school will be happy to assist.