

AEB 3510: Quantitative Methods in Food and Resource Economics

Spring 2024

Instructor: Prof. Patrick S. Ward

Lecture: MWF 12:50 PM – 1:40 PM

Office hours: Monday 9:00 – 10:00 AM
Wednesday 9:00 – 10:00 AM

Teaching Assistant: Yingchen Xu

Office hours: Thursday 3:00 – 4:00 PM

Email: wardp@ufl.edu

Lecture location: Leigh Hall 0207

Office hour location: McCarty B 1121

Phone: (352) 294-9050

Email: yingchenxu@ufl.edu

Office hour location: TBD

Course Description: Develops understanding of finite mathematical tools used in economics and business decision making. Topics include linear equations, matrix algebra and calculus. Lectures and problems show how these tools are used to examine economic, financial and managerial problems.

Credits: 3

Grading scheme: Letter grade

Prerequisites: (AEB 3103 or ECO 2023) and (MAC 2233 or MAC 2311).

Communication: E-mail (either to my email address or via Canvas messaging) is the best way to reach me. Any issues that require action **MUST** be handled by email so that there is a written record of need. Phone calls or after class conversations are not likely to result in action. Class cancellations, changes in office hours, meeting locations, or the syllabus will be announced on Canvas. Be sure that you receive those notifications in a timely manner (controlled in your Canvas settings).

Because of the nature of the problem sets and application exercises, I will not provide assistance on problem sets or application exercises over email; if you have specific questions, please plan to attend office hours. If you have not made efforts to solve the problem, I will not provide hints on how to do so. It is not necessary for you to make appointments during office hours. Visitors will be seen on a first-come, first-served basis. Groups of students are encouraged.

Undergraduate Advisor:

Ms. Danielle Shu; 1170B McCarty Hall A; (352) 294-7640;
E-mail: dshu@ufl.edu Office Hours: daily-- 9:00 am –
12:30 pm and 1:30 pm – 4:30 pm

Undergraduate Coordinator:

Dr. Misti Sharp; 1189 McCarty Hall A; (352) 294-7632;
E-mail: mistisharp@ufl.edu Office Hours: Mon and Wed
from 2:00 – 3:30

FRE Technology Assistance:

Dave Depatie; 1197 McCarty Hall A; (352) 394-7641;
E-mail: ddepatie@ufl.edu

Course motivation (or, “Why you should be excited about taking this course”): The Italian Renaissance polymath Galileo is quoted as saying “Mathematics is the language with which the universe has been written.” Although Galileo was likely speaking metaphorically, there are some similarities between the elements of language (e.g., nouns, verbs, sentences, etc.) and the elements of mathematics (e.g., numerals, variables, expressions, operations such as addition, subtraction, multiplication, and

division, and relations such as equalities or inequalities, etc.). The field of economics uses mathematics to formally represent theories in a meaningful and unambiguous way, as well as to analytically and numerically solve complex problems that would be difficult to solve using less formal methods. This course exposes students to the various mathematical tools used in economics and business decision making, including solving systems of linear equations, matrix algebra, and calculus for optimizing objective functions. Lectures and problem sets show how these tools are used, while application exercises bridge theory and application allowing students to practice using these skills to examine economic, financial and managerial problems that food and resource economists confront on a daily basis.

Expected Student Learning Outcomes: After the successful completion of AEB 3510, a typical student should be able to:

- Demonstrate mastery of mathematical concepts, including algebra, functions and graphs, systems of linear equations, calculus of single and several variables, and optimization (with and without constraints).
- Apply these mathematical skills in a variety of economic decision-making contexts.
- Conceptualize and solve economic problems using quantitative and analytical models and frameworks.
- Develop mathematical models for economic analysis using Microsoft Excel.

Required Course Materials:

- **Text:** *Introduction to mathematical economics*, 3rd edition, by Edward T. Dowling, PhD (Schaum's Outlines). McGraw Hill. 2012. ISBN: 978-0-07-176251.
- **E-learning:** There is an [E-Learning Canvas webpage](#) for this course that can be accessed using your GatorLink username and password. On Canvas, I will provide a comprehensive set of typeset notes to complement the text and the material covered in lectures. If you are having difficulties accessing E-learning, please contact the UF Computing Help Desk by calling (352)-392-HELP or via email helpdesk@ufl.edu.
- **Other:** This course combines analytical concepts with practical application. As such, students are expected to have or develop a basic knowledge of mathematics as well as the use of computational tools (namely Microsoft Excel) for applying mathematical concepts. **If you do not have an adequate background in mathematics or Microsoft Excel, please access tutorials or other resources from Khan Academy (<https://www.khanacademy.org>), YouTube (there are many available, such as those on <https://www.youtube.com/c/HamblinMath/featured>), or LinkedIn Learning (available from <http://elearning.ufl.edu>).**

Class Structure: The class format is that of a traditional lecture. To maximize your learning experience, you should attend every class. As will be discussed below, regular class attendance and active class participation account for a portion of your final grade.

Course Assignments and Expectations:

Attendance and participation: Although you may be familiar with some of the mathematical methods that will be discussed in this class, you most likely will not have seen these mathematical methods applied to specific problems that arise in economics and business. It is therefore important that you attend class meetings regularly to ensure that you familiarize yourself with these specific applications. If you have to miss class for any reason, please email the instructor as far in advance as possible so you can be prepared for the material that is expected to be covered in your absence. Active participation in class will also enhance your overall learning experience and will create a vibrant learning environment that will benefit everyone in class.

Problem sets: These are meant to give you opportunities to master the mathematical methods that we discuss in the regular class meetings. There will be 9 problem sets over the course of the semester, so you will be expected to stay up-to-speed with the material that is covered in class. Many of the methods that we will cover will build on one another, so the problem sets are structured in a scaffolded framework, and it is important that you master the material in a sequential fashion to ensure a solid foundation. The eight problem sets with the highest scores will be incorporated in the final course grade. Problem sets must be handed in at the beginning of the class period in which they are due to be eligible for full credit. Late submissions will be deducted 10 points for each 24-hour period past the due date/time. Any problem set submitted more than 72 hours past due will not receive any credit.

Application exercises: These group-based exercises are meant to bridge the gap between theory and practice. In these exercises, students will work in groups of 4-5 students and have the opportunity to use Microsoft Excel to apply the mathematical methods learned in class to the types of real-world problems that food and resource economists encounter in their day-to-day work. The final submissions will be in the form of written reports of 3-5 pages addressing a series of discussion questions that will be provided, along with analytical or numerical elements to support the discussion. The types of exercises include simple economic modeling and computing market equilibrium, equilibrium displacement and evaluating the impacts of supply and/or demand shocks (e.g., weather shocks), and optimizing economic functions (e.g., profit maximization).

Exams: There will be one midterm exam and one final exam; the midterm exam will be held on February 23, 2024 (in class) and the final exam will be held on April 30, 2024 (during the final exam period). The midterm exam will focus on concepts and methods from the first half of the semester, primarily related to linear algebra. The final exam will primarily focus on the concepts and methods from the second half of the semester, primarily applications of calculus (though there are some elements of linear algebra that will arise).

Composition of Final Score:

Course Assignments	Total Points
Attendance	30 points
Participation	30 points
Problem sets (best 8 scores)	240 points (30 points each)
Application exercises (3)	300 points (100 points each)
Midterm exam (October 11, 2023)	200 points
Final exam (April 30, 2024; 3:00 – 5:00 PM)	200 points
Total	1000 points

Letter grade distribution:

Grade	Percentage	Total points	Grade Points
A	93% or more	≥ 930	4.00
A-	90.0 – 92.9%	900 - 929	3.67
B+	86.0 – 89.9%	860 - 899	3.33
B	83.0 – 85.9%	830 - 859	3.00
B-	80.0 – 82.9%	800 - 829	2.67
C+	76.0 – 79.9%	760 - 799	2.33
C	73.0 – 75.9%	730 - 759	2.00
C-	70.0 – 72.9%	700 - 729	1.67
D+	66.0 – 69.9%	660 - 699	1.33
D	63.0 – 65.9%	630 - 659	1.00
D-	60.0 – 62.9%	600 - 629	0.67
E	59.9% or less	≤ 629	0.00

****Please note that grades are not ‘rounded’ or ‘adjusted’ at the end of the term.****

This class adheres to UF grading policies:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Grades and Grade Points: For information on current UF policies for assigning grade points, see

<https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

Attendance and Make-Up Work: Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at:

<https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

Course Evaluation: Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at: <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at: <https://gatorevals.aa.ufl.edu/public-results/>.

Academic Honesty: As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: “*We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.*” You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: “*On my honor, I have neither given nor received unauthorized aid in doing this assignment.*”

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams).

Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: <http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code>.

Software Use: All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

Services for Students with Disabilities: The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

0001 Reid Hall, 352-392-8565, <https://disability.ufl.edu/>

Campus Helping Resources: Students experiencing crises or personal problems that interfere with their general wellbeing are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

Health and Wellness: *U Matter, We Care:* If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit [U Matter, We Care website](#) to refer or report a concern and a team member will reach out to the student in distress.

Counseling and Wellness Center: [Visit the Counseling and Wellness Center website](#) or call 352-392-1575 for information on crisis services as well as non-crisis services. Address: 3190 Radio Road. Services provided:

- Counseling services
- Groups and workshops
- Outreach and consultation
- Self-help library
- Wellness coaching

Student Success Initiative: <https://studentsuccess.ufl.edu/> Services provided:

- Advising
- Peer mentoring
- Coaching
- Peer tutoring

Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or [visit the Student Health Care Center website](#).

Academic Resources

E-learning technical support: Contact the [UF Computing Help Desk](mailto:helpdesk@ufl.edu) at 352-392-4357 or via e-mail at helpdesk@ufl.edu.

Career Connections Center: Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.

Library Support: Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center: Broward Hall, 352-392-2010 or to make an appointment 352- 392-6420. General study skills and tutoring.

Writing Studio: 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.

Student Complaints On-Campus: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>

On-Line Students Complaints: <https://pfs.tnt.aa.ufl.edu/state-authorization-status/#student-complaint>

Lauren’s Promise: I will listen and believe you if someone is threatening you.

Lauren McCluskey, a 21-year-old honors student athlete, was murdered on October 22, 2018, by a man she briefly dated on the University of Utah campus. We must all take actions to ensure this never happens again. Any form of sexual harassment or violence will not be excused or tolerated at the University of Florida.

If you are experiencing sexual assault, relationship violence, or stalking, you can take the following actions:

- If you are in immediate danger, call 911.
- Report it to me, and I will connect you to resources.
- Seek confidential sources of support and help:
 - [UFPD Office of Victim Services](#): 51 Museum Road, 352-392-5648
 - [Sexual Assault Recovery Services \(SARS\)](#): Infirmary Building, 352-392-1161
 - Alachua County Rape Crisis Center (confidential): 352-264-6760

Diversity, Equity, and Inclusion: The University of Florida’s College of Agricultural and Life Sciences (CALS) supports the University of Florida’s commitment to diversity, equity, and inclusion. By fostering a sense of belonging for students, staff, and faculty, while leveraging the uniqueness of the people who study and work at the university, we believe our campus community is enriched and enhanced by diversity, including but not limited to, race, ethnicity, national origin, gender, gender identity, sexuality, class, and religion. This course will support an understanding of the diversity of our distance and campus communities as well as our agricultural and natural resource communities, locally and globally.

This course will strive to create a learning environment for students that supports a diversity of thoughts, perspectives, and experiences while honoring your identities. In this class we will take the following approaches to help achieve this:

- All course participants will use the names and pronouns provided by students for use in class. If these differ from those that appear in official university records, you can change your Display Name at One.UF.
- If your performance in this course is being impacted by your experiences inside and/or outside the classroom, do not hesitate to contact the instructor and/or teaching assistant (TA). Instructors in CALS are a great resource for you and you may provide feedback anonymously. Feedback may result in general announcements to the class, if necessary, or reporting to appropriate UF personnel to address your concerns.
- CALS instructors and Tas, like many people, are still in the process of learning about diverse perspectives and identities. If something was said in class (by anyone) that makes you feel uncomfortable, please discuss with your instructor or TA or contact the CALS Dean's Office (cals-dean@ufl.edu).

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Tentative Weekly Schedule:

Week	Dates	Content	Assessments
1	1/8, 1/10, 1/12	Course introduction; review of algebra	
2	1/15	Dr. Martin Luther King, Jr. Day – No class	
	1/17, 1/19	Review of algebra (continued)	PS1
3	1/22, 1/24, 1/26	Solving systems of 2 linear equations; examples of simple linear systems in economics	App1
4	1/19, 1/31, 2/2	Linear systems in n-variables; linear systems in matrix form	PS2
5	2/5, 2/7, 2/9	Linear systems in matrix form; determinants	PS3
6	2/12, 2/14, 2/16	Properties of the determinant; matrix algebra; matrix inversion; equilibrium displacement: theory	
	2/19	Equilibrium displacement: application	App2
	2/21	Review	
	2/23	Midterm Exam	Exam
8	2/26, 2/28, 3/1	Limits; continuity; the derivative; differentiability; derivative notation	PS5
9	3/4, 3/6, 3/8	Derivative rules for functions of a single variable; differentiation of exponential and logarithmic functions; marginal concepts in economics	PS6
10	3/11, 3/13, 3/15	Spring Break – No class	
11	3/18, 3/20, 3/22	Increasing and decreasing functions; optimization of functions with a single variable	
12	3/25, 3/27, 3/29	Partial derivatives; second-order partial derivatives; optimization of functions with multiple variables	PS7
13	4/1, 4/3, 4/5	Optimization of functions with multiple variables (continued); first- and second-order conditions	PS8
14	4/8, 4/10, 4/12	First- and second-order conditions (continued); restrictions on variables; constrained optimization	
15	4/15, 4/17, 4/19	Constrained optimization (continued); applications of constrained optimization in economics	PS9, App3
16	4/22	Applications of constrained optimization in economics (continued)	
	4/24	Review for Final Exam	
	4/30 3:00 – 5:00 PM	Final Exam	Exam

Note: The instructor reserves the right to change the terms and dates stated in this course syllabus at any time. Any changes will be communicated on Canvas as an announcement. It is solely the student's responsibility to stay informed of any changes.

*****By enrolling in this course, you are agreeing to the terms outlined in this syllabus!*****