

AEB 3510: Quantitative Methods in Food and Resource Economics

Fall 2022

Instructor: Prof. Patrick S. Ward

Lecture: MWF 12:50 PM – 1:40 PM

Office hours: Tuesday 10:00 AM – 11:00 AM
Wednesday 2:00 PM – 3:00 PM

Teaching Assistant: Md. Roknuzzaman (Rokon)

Office hours: Friday 10:00 AM – 11:00 AM

Email: wardp@ufl.edu

Lecture location: Anderson 101

Office hour location: McCarty B 1121

Phone: (352) 294-9050

Email: md.roknuzzaman@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. 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. Lectures will be recorded and posted on Canvas to provide equal access to all students, but to maximize your learning experience, you should attend every class.

Course Assignments and Expectations:

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 14 problem sets over the course of the semester (nearly one per week), 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 twelve problem sets with the highest scores will be incorporated in the final course grade.

Application exercises: These exercises are meant to bridge the gap between theory and practice. In these exercises, students will have the opportunity to use Microsoft Excel and 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 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 two midterm exams over the course of the semester: the first on October 10 and the second on the final day of class, December 7. The first midterm exam will focus on concepts and methods from the first half of the semester, primarily related to linear algebra. The second midterm 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, especially in the context of constrained optimization with several variables).

Composition of Final Score:

Course Assignments	Total Points	% of Total
Problem sets (best 12 of 14)	300 points (25 points each)	30%
Application exercises (3)	300 points (100 points each)	30%
Midterm exam 1 (October 10, 2022)	200 points	20%
Midterm exam 2 (December 7, 2022)	200 points	20%
Total	1000 points	100%

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/>

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. **If a student is deemed to have violated the Honor Code on an assignment, they will receive zero points on that assignment. Repeated 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: <https://sccr.dso.ufl.edu/process/student-conduct-code/>

Plagiarism: The Student Honor Code and Student Conduct Code states that:

"A Student must not represent as the Student's own work all or any portion of the work of another. Plagiarism includes but is not limited to:

- Stealing, misquoting, insufficiently paraphrasing, or patch-writing.
- Self-plagiarism, which is the reuse of the Student's own submitted work, or the simultaneous submission of the Student's own work, without the full and clear acknowledgment and permission of the Faculty to whom it is submitted.
- Submitting materials from any source without proper attribution.
- Submitting a document, assignment, or material that, in whole or in part, is identical or substantially identical to a document or assignment the Student did not author."

COVID-19 University Policy: As Gators, we are characterized by our resilience as well as our commitment to caring for one another. In that vein, the university welcomes – but does not require – people to wear masks on campus. Further, in alignment with guidance from the Centers for Disease Control and Prevention as well as UF Health, we continue to encourage everyone to get vaccinated to minimize their risk of complications from COVID-19. To learn more about COVID-19 vaccines, testing and related topics, visit <https://coronavirus.uflhealth.org>.

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/>. In general, you are expected to be in class each day and submit all work on time on Canvas.

Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the [Disability Resource Center](#). It is important for students to share their accommodation letter with their instructor and discuss their access needs as early as possible in the semester.

Course Evaluation

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 are 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/>.

In-Class Recording

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled.

The only allowable purposes are: (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

University Honesty Policy

UF students are bound by The Honor Pledge: “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students 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.” The Conduct Code specifies a number of behaviors that are in violation of this code and the possible sanctions. [Click here to read the Conduct Code](#). If you have any questions or concerns, please consult with the instructor or TAs in this class.

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. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see the [Notification to Students of FERPA Rights](#).

Campus Resources:

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.

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](#).

University Police Department: [Visit UF Police Department website](#) or call 352-392-1111 (or 9-1-1 for emergencies).

UF Health Shands Emergency Room / Trauma Center: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; [Visit the UF Health Emergency Room and Trauma Center website](#).

Academic Resources

E-learning technical support: Contact the [UF Computing Help Desk](#) 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: [Visit the Student Honor Code and Student Conduct Code webpage for more information](#).

On-Line Students Complaints: [View the Distance Learning Student Complaint Process](#).

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 \(SARS\)](#): Infirmery 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).

AEB 3510: Quantitative Methods in Food and Resource Economics – Fall 2022

Weekly Schedule:

Week	Dates	Content	Assessments
1	Aug 24, 26	Course introduction and review of algebra (Ch. 1)	
2	Aug 29, 31, Sep 2	Review of algebra (continued) (Ch. 1)	PS1
3	Sep 5	Labor Day Holiday	
	Sep 7, 9	Systems of simple linear equations	PS2; App1
4	Sep 12, 14, 16	Linear systems in n -variables	PS3
5	Sep 19, 21, 23	Linear systems in matrix form; determinants of 2×2 matrices (Ch. 10)	PS4
6	Sep 26, 28, 30	Determinants of higher-dimensional matrices, matrix algebra, matrix inversion (Ch. 10, 11)	PS5
7	Oct 3, 5	Matrix inversion (continued); Cramer's Rule (Ch. 11)	PS6; App2
	Oct 7	No class – Homecoming	
8	Oct 10	MIDTERM EXAM	Exam 1
	Oct 12, 14	Limits and continuity (Ch. 3)	PS 7
9	Oct 17, 19, 21	Derivatives; differentiability; derivative notation; rules for differentiation of functions of a single variable (Ch. 3)	PS8
10	Oct 24, 26, 28	Marginal concepts in economics; higher-order derivatives; increasing and decreasing functions; concavity and convexity; optimization (Ch. 3)	PS9
11	Oct 31, Nov 2, 4	Optimization of single-variable functions; first- and second-order partial derivatives (Ch. 4, 5)	PS10
12	Nov 7, 9	Optimization of functions with multiple variables (Ch. 5)	PS11
	Nov 11	Veteran's Day Holiday	
13	Nov 14, 16, 18	First- and second-order conditions; restrictions on variables (Ch. 5)	PS12
14	Nov 21	Constrained optimization (Ch. 6)	App3
	Nov 23, 25	Thanksgiving Holiday	
15	Nov 28, 30, Dec 2	Constrained optimization (Ch. 6)	PS13
16	Dec 5	Applications of constrained optimization in economics (Ch. 6)	PS14
	Dec 7	MIDTERM EXAM	Exam 2

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 e-learning 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!*****