University of Florida
College of Agricultural and Life Sciences
Food and Resource Economics Department

AEB3510 Quantitative Methods in Food and Resource Economics
Spring Term 2019
3 Credit Hours

Instructor and Contact Information

Instructor:	Luis Moisés Peña Lévano, Ph.D.	
Office:	1200 N Park Rd, Office # 104, Plant City, FL, 33563	
E-mail:	lpenalevano@ufl.edu	
Office hours:	**In Person**	Gainesville: McCarty B, room 1125
		July 12th: 8:00 am – 10:00 am
		August 5th: 8:00 am – 10:00 am
	Online	By appointment
Review sessions:	Gainesville: McCarty A, room TBA	
	July 12th: 10:00 am – 12:00 pm	
	August 5th: 10:00 am – 12:00 pm	

Communication must include 'AEB3510 – UNIT #____ + (YOUR LAST NAME AND FIRST NAME)' in order to be answered. Use the Canvas Email to contact the constructor. Any email must be sent during NORMAL HOURS: Monday to Fridays 8:00 am – 5:00 pm. Emails sent outside the normal hours, or not using the title '**AEB3510'** **may not be answered**.

The emails will need to go through the following procedure:
1. Summarize in **one paragraph** of no more than three lines the e-mail question so that I can more effectively address your concerns. If you are stuck on a specific procedure, send me the picture of the problem and where you are specifically having the issue. This will help me to provide feedback. If you do not put an effort in attempting to solve the question, I will not provide you the hints to solve it
2. *Courteous and professional* e-mails may expect a prompt reply.
3. I will hold office hours days in Gainesville. Notice that I am located at **Plant City, FL**, therefore I will go to main campus only for review sessions and office hours.
3. After the office hours, I will also provide 2 hours of review sessions (from 10 am – 12 pm) on a classroom (Classroom location is still pending). You can bring any questions you have, and additional examples will be offered too.

The professor reserves the right to change the terms and dates stated in this Course Syllabus depending on upcoming or unexpected events. Any changes will be communicated in class, via the Gatorlink e-mail listserv, and posted on E-Learning Canvas. It is solely the student's responsibility to stay informed of any changes

General Course Information

Textbook:
Required: *Mathematical Methods for Business and Economics*, Schaum's Outlines, by Edward T. Dowling. McGraw Hill/Irwin Publishers. 1993. ISBN: 0-07-017697-3.
- You will need a copy of the book. Please note that there are several editions of the book, all with different covers. All versions are the same, so either one would work
- This book is pretty useful tool, as it offers many solved examples for many of the questions.

Strongly recommended: *Schaum's Outlines of Introduction to Mathematical Economics*, by Edward T. Dowling. 3rd Edition. McGraw-Hill Publishers. 2012. ISBN: 978-0-07-161015-5
- This book contains additional problems and exercises that can be useful for this class. In particular, topics related to matrices and special matrices are included in this unit.

Course Description: This course is intended to develop the student's understanding of finite mathematical tools used in economics and business decision-making. Topics include linear equations, matrix algebra, linear programming and calculus. Lectures and problems will show how these are used to examine economic, financial and managerial problems. Likewise, in further topics we will make use of Excel to solve mathematical configurations. We will also cover some advanced topics, such as multivariate calculus, Lagrange multipliers, integration, and application of matrix algebra in calculus.

AEB3510 is an applied mathematics course. Up to this point, most mathematics courses you have taken have focused on computational mathematics. This course, however, will emphasize mathematical reasoning and methodology applied in economic problems.

This is an upper-division course and it is structured and taught accordingly. The importance in the curriculum means you should plan on spending time to review the online lectures. During exam weeks, the time-commitment will be significantly higher. So please study ahead of time to expect a good grade in this class.

Grading system: The grading system is online through Canvas. This is an automatic/systematic process. Thus, the instructor does not generally insert the grades. The system automatically grades it and tabulate it. The purpose of the professor in this class is to **instruct you** in the course, not to directly grade you. Thus, it is your responsibility to obtain good grades, not the instructor to give it. Please, submit the assignments before the deadlines and perform well in the class.

Prerequisites: MAC2233 or MAC2311 (or the equivalent). AEB3510 is taught with the assumption that all students are comfortable with quantitative reasoning, analytical methods, derivatives, graphs, and algebra. It is further assumed that all students have had at least one economics course (i.e., either ECO2013, ECO2023, AEB3103 or the equivalent).
It is also expected that students must have basic knowledge of Excel. We will use standard Windows Excel version. Please install it in your laptops and plan accordingly.

Course objectives: After the successful completion of this course, students should
1. Be able to use calculus and algebra in economic optimization
2. Understand the mathematical principles required to maximize consumers satisfaction
3. Be able to analyze the impact of changes of external variables in an optimization problem
4. Be able to use linear programming to optimize firms' goals
5. Have a strong foundation necessary to succeed in the FRE major

Brief Course Outline: The material in AEB3510 is divided in eleven units, each subdivided in chapters

Week	Chapter	Description
UNIT 1. SYSTEM OF EQUATIONS		
1	1	Linear Equations
1	2	System of linear equations
1	3	2x2 system of linear equations
1	4	Solving systems of linear Equations
1	5	Economic applications of linear equations
UNIT 2. FUNCTIONS		
1	6	Exponents
1	7	Defining functions
1	8	Quadratic functions
1	9	Exponential functions
1	10	Logarithmic functions
UNIT 3. MATRIX ALGEBRA		
2	11	Matrix operations
2	12	Matrix and Vector Multiplication
2	13	Linear independence and determinants
2	14	Linear equation in matrices
2	15	Inverse matrices
2	16	Cramer's rule
UNIT 4. FOUNDATION OF DERIVATIVES		
2	17	Limits and the principle of derivatives
2	18	First-order derivatives
2	19	Derivatives of compounded functions
2	20	Higher order derivatives
EXAM 1		
UNIT 5. DERIVATIVE APPLICATIONS		
3	21	Derivatives tests
3	22	Optimization
3	23	Sketching graphs
3	24	Derivatives: Application in economics
UNIT 6. PARTIAL DERIVATIVES		
3	25	First order partial derivatives
3	26	Cross and second order derivatives
3	27	Optimization of functions
3	28	Constrained optimization: The Lagrange function
EXAM 2		
UNIT 8. LINEAR PROGRAMMING		
4	33	Inequalities
4	34	Linear optimization
4	35	Dual & Primal in LP
UNIT 10. INTEGRALS		
5	39	Indefinite integrals
5	40	Definite integrals & Areas
5	41	Integration techniques
5	42	Integral application in economics
UNIT 11. COMPARATIVE STATICS & OPTIMIZATION		
5	43	Comparative statics
5	44	Concave optimization
5	45	Integral application in economics
EXAM 3		
UNIT 9. MATHEMATICAL APPLICATIONS		
6	36	Input-output analysis: Applications
6	37	Linear Programming in Solver
6	38	LP Applications in Economic Enterprises
UNIT 7. SPECIAL MATRICES		
6	29	Matrix operations in multivariate functions
6	30	Discriminants & Jacobian
6	31	Hessian matrices: Optimization
6	32	Bordered-Hessian: Constrained optimization
FINAL EXAM		

Evaluation of Performance and Grading

Grades: You have the *opportunity* to earn up to **1000** points throughout the semester. Your final grade in AEB3510 will be based composed by the following items described on the right figure.

1. Pre-lab assignments: Each unit is divided in chapters. In order to motivate reading completely through the whole material, there will be pre-labs which are from 5 to 10 questions based on examples explained in the videos. It is your task to follow step by step and use your own words and understanding to present the material. **Copy paste from the video is not permitted**. Students are required to show the reasoning on the topics. Pre-lab assignments are expected to be submitted by **4:59 pm of the due date**. *After* that time, the points earned is **zero [0] points**.

Description	Quantity	Unit Value	Total
Prelabs	9	15	135
Quiz	10	20	200
Homework	6	50	300
Midterms	3	100	300
Mini-Project*	1	15	15
Final exam	1	50	50
TOTAL			1000

2. Quizzes: There is one quiz per unit. The duration is 25-30 minutes, and these are 3-5 short questions. These are open book. Submission deadline is at **11:59 pm**. Note, the first quiz is based on this syllabus.

3. Homework Assignments: There are 6 assignment, overall one per week. All assignments must be clearly written showing the reasoning step by step. All assignments are expected to be submitted by **4:59 pm of the due date**. Late homework submissions will be **subtracted 25% if turned the next day**. At the **second** day of delay or later, assignments are **no longer accepted** and there are **no make-up opportunities** given. Please note that homework assignments are **30% of your total grade**. All homework must be submitted via online through canvas using the following title: AEB3510 ASSIGNMENT #_____   %LAST NAME%   %FIRST NAME%

Excel Applications: Excel skills are expected on this class. Unit 9 is based on Excel Applications. Please review this tool as we will cover chapters that implement mathematical applications into economics using Excel. Note: you need to create your Excel file from scratch. **Using a classmate's template is not permitted**.

4. Mid-terms: There will be three regular exams ('Mid-term exams') offered during the semester. Each exam is worth **100 points**. The exams will consist of different multiple-choice, essay and math-solving questions. Midterms are taken via **Proctor-U**, the time you can take each midterm is 4:00 pm to 6:00 pm of the exam day. You can start your exam between 4:00 pm to 4:30 pm. The exam takes 90 minutes to be solved. I will provide 10 more minutes in order to avoid issues in the system. Please notice the following details:
- For midterm 01: No calculators are allowed.
- For midterm 02 and 03: You are allowed any calculator.

You are allowed to write **one cheat sheet** for each midterm; however, you need to upload it the day before the midterm in order to be valid for use. You need to delete all scratch paper upon finishing each midterm.

I will provide an option to take the midterms in person depending on the classroom availability. This will be provided at 4:30 pm to 6:00 pm of the exam day. You can bring a copy the cheat sheet you prepared for the exam, but you will have to discard it after the exam.

5. Mini-project: In this task, you will create and solve one math economic problem using any of the topics of your choice learned in this class. You need to be imaginative: use a TV show, anime, soap opera, history, peer-reviewed journal news or any other material. Originality is key. The basis is 15 points, but you can **earn up** to **5 bonus points** if you do an outstanding job. The deadline of the mini-project for Summer2019 is **August 8th** at 5:00 pm. You cannot repeat any example from the class or the books, this would disqualify your project.

6. Final Exam: A **comprehensive mandatory Final Exam** is given on **August 9th.** This counts as 5% points of your final course grade. Early or late exams are not given. Please plan accordingly.

On the other side, there are **five ways to obtain bonus points**:
(1) If all students fill out the faculty evaluation, this will allow to get **2 extra questions in the final exam** (this is worthy **10 bonus points**).
(2) There will also be a mid-semester survey. This will allow you to give **one bonus question** for Midterm 02 (worthy **5 bonus points**).
(3) If your mini-project (described in the course description section) is written in a state-of-art manner, it can receive up to **5 more bonus questions**.
(4) If you attend at the **two** review AEB3510 sessions, you will receive **5 bonus points**.
(5) In addition, you have the opportunity to obtain additional bonus points by solving the problems of a special option unit (**Unit 07**), which provides an optional pre-lab (**5 pts**) and Homework (**20 pts**).

Final Grade	Minimum Score
A	930
A-	900
B+	870
B	830
B-	800
C+	770
C	730
C-	700
D+	670
D	630
D-	600
F	0

This means that there are **50 possible bonus points**, which is equivalent to 5% of the total grade. This can make a change in letters (from B+ to A- for example). No other opportunities to increase your score will be given.
Final course grades will have the following benchmarks out on **1000** possible grade points as described on the left figure. Please note that grades are **not 'rounded'** or **'adjusted'** at the end of the term. Haggling over grades at the end of the semester is NOT entertained. Of course, if I did a mistake in grading your exam I will gladly give you the correct points. If you believe that your exam is incorrectly graded or that your grade is incorrectly posted, please contact me via e-mail (i.e., in writing) as soon as possible. You have **2 business days** after the grade has been posted to voice your concern. After 2 days have passed, your **posted grade will be assumed to be correct and accurate**.
For general information about grading and grading policy at the University of Florida, please refer to: http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html.

Special Note: If a student has 900 points or more (not including bonus points) before the final exam, this person is exempt to take the final exam and receives an A in the class.

Make-Up Exams: Make-up exams **are not given**. This policy applies for missing a mid-term, except for extreme circumstances. Should you miss the Final Exam for any reason, please visit the Dean Office and the Graduate Coordinator to provide official records.

Extenuating Circumstances
Exceptions to the Missed Assignment Policy reflect excused University events that fall under the 12-day rule or are serious in nature. These exceptions referred as "Extenuating circumstances" require formal, letter-head documentation from a UF faculty/academic advisor, or an email from the UF Dean of Students Office sent to the instructor's UF email address, within 24 hours of assignment deadline. A health-clinic note does not warrant extenuating circumstances and the "Missed Assignment" Policy (above) will apply.

Student Responsibility for Online Submissions
Students are responsible for ensuring and verifying that all assignment files are uploaded successfully into Canvas. The instructor is not responsible for internet connections or failures. Students are strongly advised **against using wireless connections to complete quizzes or upload assignments**. Wireless connections have been problematic in previous semesters with students losing all points due to upload failure. A hard-wired connection can be located at any UF computer lab on campus or any public library to submit graded assignments. TO REPEAT, **wireless connections are problematic**, and quizzes or assignment uploads may not be saved (without any warning) and therefore locating a hard-wired connection is recommended to submit any graded assignments.

Exam day policy: Please arrive with your ID five minutes early, if possible, to get seated and get your books/bags stored away so that the exam can start on the stated time. If you need to use the bathroom, please do so before the exam begins. Students are **not allowed to leave the Proctor-U lab** during any of the **exams** and re-enter the classroom.

Special Office hours: The instructor of the class will have two different two-hour sessions scheduled (from 8 to 10 am). It is not mandatory but highly encouraged to attend. During these hours, the instructor will solve any doubt concerning any material of the class.

Review sessions: Dr. Luis will offer two review sessions (from 10 am to 12 pm). It is not mandatory but highly encouraged to attend. During these hours, the instructor will discuss any doubts from the class and provide additional examples.

Online course evaluation: Student assessment of instruction is an important part of efforts to improve teaching and learning. As a motivation, there will be **10 extra bonus points for the final exam if the task is completed**. 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. These evaluations are conducted online at **https://evaluations.ufl.edu**. Evaluations are typically open for students to complete during the last two weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results

Timeline of the units covered in class – Summer 2019

The dates that each unit is expected to be covered, together with due dates for all assignments (pre-labs, quizzes, assignments, exams) and special office hours of Dr. Luis Peña-Lévano are presented in the timeline below:

Week #	Month	Days of the Week				
		M	T	W	R	F
1	July	1	2	3		5
2		8	9	10	11	12
3		15	16	17	18	19
4		22	23	24	25	26
5	Aug	29	30	31	1	2
6		5	6	7	8	9

Unit	Description	Pre-lab	Quiz	Homework	Review/Office	Exam
1	System of equations	Jul 2 [T]	Jul 2 [T]			
2	Functions	Jul 3 [W]	Jul 3 [W]	Jul 5 [F]		
3	Matrix Algebra	Jul 8 [M]	Jul 9 [T]			
4	Foundation of Derivatives	Jul 10 [W]	Jul 11 [R]	Jul 12 [F]	Jul 12 [F]	
	EXAM MIDTERM 1					Jul 12
5	Derivative applications	Jul 15 [M]	Jul 16 [W]			
6	Partial Derivatives	Jul 18 [R]	Jul 18 [R]	Jul 19 [F]		
	EXAM MIDTERM 2					Jul 22
8	Linear Programming	Jul 24 [W]	Jul 26 [F]	Jul 26[F]		
10	Integrals	Jul 30 [T]	Jul 31 [W]			
11	Comparative statics	Aug 1 [R]	Aug 1[R]	Aug 2 [F]	Aug 5 [F]	
	EXAM MIDTERM 3					Aug 5
9	Mathematical applicaton			Aug 7 [R]		
	FINAL EXAM					Aug 9
7	Special Matrices (Optional)	Aug 8 [F]		Aug 8 [R]		
*	Syllabus	Special Quiz:	Jul 5 [F]			

ADDITIONAL EXAMPLES AND PROBLEMS

Book Notation: *Mathematical methods for Business and Economics (MMBE)*

Introduction to Mathematical Economics (IME)

UNIT 01: System of equations

MMBE: CH02 (Equations) & CH04 (System of equations)

UNIT 02: Foundations of Algebra and Arithmetic (Functions)

MMBE: CH01 (Review) & CH03 (Functions)

IME: CH01 (Review)

UNIT 03: Matrix Algebra

MMBE: CH05 (Linear Algebra) & CH06 (Matrix Application)

IME: CH10 (Fundamentals of Algebra) & CH11 (Matrix inversion)

UNIT 04: Foundation of derivatives

MMBE: CH09 (Calculus) & CH11 (Exp & Log functions)

IME: CH04 (The rules of differentiation) & CH09 (Exp differentiation)

UNIT 05: Derivative applications

MMBE: CH10 (Uses of derivative)

IME: CH05 (Uses of derivatives)

UNIT 06: Partial derivatives

MMBE: CH13 (Multivariate calculus)

IME: CH05 (Calculus of multivariate functions) & CH06 (Application)

UNIT 07: Special matrices

IME: CH12 (Special determinants and matrices)

UNIT 08: Linear programming (LP)

MMBE: CH07 (LP using graphs), CH08 (Dual LP)

UNIT 10: Integral calculus

MMBE: CH12 (Integral calculus)

IME: CH13 (Indefinite integrals) & CH14 (Definite integrals)

UNIT 11: Comparative Statics & Concave Programming

IME: CH15 (Comparative Statics)

NOTE: UNIT 09 (Mathematical applications) is not covered by the recommended books.

Other Important Information

Students are responsible for all deadlines/critical dates and policies set forth by the University of Florida. Deadlines/critical dates are published on the University of Florida Office of the University Registrar's web-site, http://www.registrar.ufl.edu/. Current academic policies are presented in the University of Florida Undergraduate Catalog, https://catalog.ufl.edu/ugrad/current/Pages/home.aspx. Please familiarize yourself with this information.

Students Requesting Classroom Accommodation: 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 with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodations. Students with disabilities should follow this procedure as early as possible in the semester. This must be done at least 10 days prior to any accommodation is needed.

UF Counseling Services: The life of a college student can sometimes be overwhelming. Resources are available on-campus to help students manage personal issues or gain insight into career and academic goals. Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's various counseling resources. The following resources are available for all UF students:

- For general student affairs: Dean of Students Office, 392-1261 (after hours, please call 392-1111);
- For mental health consultations: Counseling & Wellness Center, 392-1575 (24/7 phone access);
- For students experiencing distress: U Matter, We Care, 294-2273, www.umatter.ufl.edu;
- For physical health consultations: Student Health Care Center, 392-1161;
- For victims of sexual assault: Office of Victim Services, 392-5648 (after hours, please call 392-1111);
- For career guidance: Career Resource Center, 392-1602, www.crc.ufl.edu.

Software Use: All faculty, staff, and students of the University of Florida 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.

Academic Honesty: In 1995 the UF student body enacted an honor code and voluntarily committed itself to the highest standards of honesty and integrity. When students enroll at the university, they commit themselves to the standard drafted and enacted by students. In their words, **the Honor Code Preamble:** In adopting this honor code, the students of the University of Florida recognize that academic honesty and integrity are fundamental values of the university community. Students who enroll at the university commit to holding themselves and their peers to the high standard of honor required by the honor code. Any individual who becomes aware of a violation of the honor code is bound by honor to take corrective action. The quality of the University of Florida education is dependent upon community acceptance and enforcement of the honor code.

> *The Honor 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.*

On all work submitted for credit by students at the university, the following pledge is either required or implied: **"On my honor, I have neither given nor received unauthorized aid in doing this assignment."** The university requires all members of its community to be honest in all endeavors. A fundamental principle is that the whole process of learning and pursuit of knowledge is diminished by cheating, plagiarism and other acts of academic

dishonesty. In addition, every dishonest act in the academic environment affects other students adversely, from the skewing of the grading curve to giving unfair advantage for honors or for professional or graduate school admission. Therefore, the university will take severe action against dishonest students. Similarly, measures will be taken against faculty, staff and administrators who practice dishonest or demeaning behavior.

Student Responsibility: Students should report any condition that facilitates dishonesty to the instructor, department chair, college dean or Student Honor Court.

Faculty Responsibility: Faculty members have a duty to promote honest behavior and to avoid practices and environments that foster cheating in their classes. Teachers should encourage students to bring negative conditions or incidents of dishonesty to their attention. In their own work, teachers should practice the same high standards they expect from their students.

Administration Responsibility: As highly visible members of our academic community, administrators should be ever vigilant to promote academic honesty and conduct their lives in an ethically exemplary manner. This policy will be vigorously upheld at all times in this course.

Any instances of academic dishonesty will be reported to Student Judicial Affairs.

Student complaints: The University of Florida believes strongly in the ability of students to express concerns regarding their experiences at the University. The University encourages its students who wish to file a written complaint to submit that complaint directly to the department that manages that policy.
- For a residential course, please read the following link:
  https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf
- For an online course, please follow this link:
  http://www.distance.ufl.edu/student-complaint-process

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

I wish everyone a rewarding and productive semester ☺