

University of Florida  
College of Agricultural and Life Sciences  
Food and Resource Economics Department – Plant City Campus

## **AEB3510 Quantitative Methods in Food and Resource Economics**

**Fall Term 2018**

3 Credit Hours

### **Scheme of the class:**

Face-to-face lecture: Tuesdays and Wednesdays at 9:00 – 10:00 am

Online lectures: Posted every Tuesday at 7:00 pm

Workshop FRE: August Wednesday 22<sup>nd</sup> from 9:00 am – 1:30 pm

**Classroom:** Room 107, UF/IFAS Plant City Campus

### **Instructor and Contact Information**

**Instructor:** Luis Moisés Peña Lévano, Ph.D.  
**Office:** UF Plant City Campus, Office # 104  
**Phone:** (813)757- 2184  
**Office Hours:** Thursdays 11:00 am – 1:00 pm;  
Other times by appointment.  
**E-mail:** lpenalevano@ufl.edu

Many students find more comfortable and efficient to send e-mail with questions. Please note that I do not use the e-mail tool within E-Learning – please use my Gatorlink e-mail for all correspondence. When e-mailing me, please indicate in which class you are enrolled and in the subject (in one sentence) what is the e-mail question so that I can more effectively address your concerns – This will help me to answer more efficiently because I am teaching multiple classes. ***Courteous and professional*** e-mails can expect a prompt reply.

Undergraduate academic advising is handled by Mr. Jason Steward, see contact information below.

**Undergraduate Advisor:** Mr. Jason Steward; UF Plant City Campus, Office # 104;  
Phone number: (813) 757-2280;  
E-mail: jsteward@ufl.edu

***The instructor 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:** Schaum's outline of introduction to mathematical economics. Dowling, Edward T. Publisher: McGraw-Hill. 3<sup>rd</sup> edition. 2001.

ISBN: 978-0-0713-5896-5

- You will need a copy of the book. This book is the base of this class and summarize different examples of current events that apply the economic principles on current cases.

**E-Learning:** We will be using Canvas to provide documents, answer to assignments and grades. The classes will also be supported by videos that will be posted online explaining some mathematical problems and slides in advance so the student can read and receive the online lecture before coming to class.

**Special mini-book for the course:** You will receive freely (at no cost) a mini-book written by the professor of this course (Dr. Peña-Lévano). It is prohibited to share this mini-book to any other person outside the students taken this class without his permission. The copyright of this book belongs to the professor of this class. This textbook is provided for free on canvas and its divided in 11 units. Generally, we will cover one unit per week. The units are divided in: chapters with lectures, pre-labs, review of concepts, laboratory and homework. In some cases, there are additional case studies and practical applications.

**Course Description:** This course is to develop the student's understanding of finite mathematical tools used in economics and business decision-making. Topics include linear equations and programming, matrix algebra and calculus. Lectures and problems will show how these are used to examine economic, financial and managerial problems. Likewise, in further topics we will made use of Excel to solve linear programming problems as well as input-output table configurations. AEB3510 is an applied mathematics course. We will also cover some advanced topics, such as multivariate calculus, Lagrange multipliers, integration, and matrix algebra. Up to this point, most mathematics courses you have taken have focused on computational mathematics; this course, however, will emphasize mathematical reasoning and methodology.

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 outside to review the in-class and online lectures. During exam weeks, the time-commitment will be significantly higher. A lower study input will more than likely adversely affect your grade.

**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, or the equivalent). This course is complimentary and strongly advised to be taken together with AEB3103

**Attendance and related issues:** Students are assumed to be highly committed academically. We are going to proceed at a rather quick pace. Attending class is a prerequisite for doing well in this course, and it counts as part of your final grade. It is further assumed that students will arrive to class on-time.

**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 covered in AEB3510 is divided in twelve units.

	Tuesday	Wednesday	Unit name	Pre-lab	Homework
1 (22-24 Aug)*		<b>Workshop</b> Unit 1: 1 - 5	Linear Equations: Supply and Demand Analysis		
2 (27-31 Aug)	Unit 2: 6-7	Unit 2: 8-10	Algebra definitions, exponents and functions	Pre-lab 1 Pre-lab 2	Unit 1
3 (4 - 7 Sept)	Unit 3: 11-12	Unit 3: 13-14	Matrix Algebra	Pre-lab 3	Unit 2
4 (10-14 Sept)	Unit 4: 15	Unit 4: 16-17	Derivatives	Pre-lab 4	Unit 3
5 (17-21 Sept)	Unit 5: 18-20	Review Exam 1		Pre-lab 5	Unit 4
6 (24-28 Sept)	<b>Exam 1</b>	Unit 5: 21	Derivative applications		
7 (1 - 5 Oct)	Unit 6: 22-23	Unit 6: 24	Multivariate Derivatives	Pre-lab 6	Unit 5
8 (8 - 12 Oct)	Unit 7: 25	Unit 7: 26-27	Matrices: Applications	Pre-lab 7	Unit 6
9 (15 - 19 Oct)	Excel App. 1: 27 Review Exam 2			Pre-lab 8	Unit 7
10 (22 - 26 Oct)	<b>Exam 2</b>	Unit 8: 28-30	Integrals		
11 (29 - 1 Nov)	Unit 8: 31-32	Unit 9: 33-34	Linear Programming	Pre-lab 9	Unit 8
12 (5 - 9 Nov)	Unit 9: 35	Excel App. 2: 36			Unit 9
13 (13 - 16 Nov)	Excel App. 2: 36	Exc. App. 1 DUE	Comparative Statics, Concave Programming and Probability	Pre-lab 10	Exc. App. 1
14 (19 - 20 Nov)*	Exc. App. 2 DUE				Exc. App. 2
15 (26 - 30 Nov)	Unit 10: 37-38	Unit 10: 39-40	Partial Differential Equations and Dynamic Optimization	Pre-lab 11	Unit 10
16 (3 - 5 Dic)	Unit 11: 41-43	Review Exam 3			Unit 11
17 (10 - 14 Dic)**	<b>Final Exam</b>				

Each unit is divided in chapters. The classes are schedule generally on Tuesday and Wednesdays. The only exceptions will be during week #1 in which we will host a special workshop for every person that is taking a FRE course in Plant City (which will be hold on August Wednesday 22<sup>nd</sup> from 9:00 - 1:30 pm). In order to compensate for the three additional hours of the workshop on week 1, there will be no class during October Wednesday 17<sup>th</sup> (to provide one additional day for preparation for exam 2), November Wednesday 14<sup>th</sup> (in which Excel application 1 is due) and November 20<sup>th</sup> (In which Excel Application 2 is due),

Review exam days are added in order to provide reviews before the exam presented the next week.

**Holidays:** September Monday 3<sup>rd</sup> ; October Friday 12<sup>th</sup> and Saturday 13<sup>th</sup>, Thanksgiving November Wednesday 21<sup>st</sup> - Friday 23<sup>rd</sup>. Reading days December Thursday 6<sup>th</sup> and Friday 7<sup>th</sup>.

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### Description of each chapter within the units

Unit	#	Chapter name
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
2	6	Exponents
2	7	Defining functions
2	8	Quadratic functions
2	9	Exponential functions
2	10	Logarithmic functions
3	11	Matrix operations
3	12	Linear equation in matrices
3	13	Inverse matrices
3	14	Cramer's rule for solving linear equations
4	15	Limits
4	16	Notion of derivative
4	17	Rules of derivative
5	18	Derivatives tests
5	19	Optimization
5	20	Sketching the graph
5	21	Derivatives: Application in economics
6	22	Partial derivatives
6	23	Optimization of functions
6	24	Constrained optimization: The Lagrange function
7	25	Matrix operations in multivariate functions
7	26	Hessian and Bordered-Hessian
7	27	Input-output analysis: Applications
8	28	Indefinite integrals
8	29	Definite integrals
8	30	Integration techniques
8	31	Area using integration
8	32	Integral application in economics
9	33	The feasible region
9	34	Optimization in LP
9	35	The normal form, the dual
9	36	Solver: Applications in Economics using LP
10	37	Comparative statics
10	38	Concave programming and inequality constraints
10	39	Probabilities and density function
10	40	Applications: Likelihood function
11	41	First-order differential equation
11	42	First-order difference equations
11	43	Dynamic optimization

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## 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 on the following:

Sum of highest two Mid-Term exams (@ 100 points each)	200 possible points
Final Exam	150 possible points
Attendance and Participation	15 possible points
Pre-lab assignments (@10 points each)	110 possible points
Excel Applications (@25 points each)	50 possible points
In-class labs (@5 points each)	55 possible points
Review of concepts (@30 points each)	90 possible points
Quizzes (@5 points each)	55 possible points
<u>Homework Assignments (@ 20 points each)</u>	<u>275 possible points</u>
<b>TOTAL</b>	<b>1000 possible points</b>

Final course grades will have the following benchmarks out of the 700 possible grade points:

<b>A</b> ( <b>≥ 925</b> )	<b>C</b> ( <b>680 - 729</b> )
<b>A-</b> ( <b>880 - 924</b> )	<b>C-</b> ( <b>640 - 679</b> )
<b>B+</b> ( <b>850 - 879</b> )	<b>D+</b> ( <b>600 - 639</b> )
<b>B</b> ( <b>820 - 849</b> )	<b>D</b> ( <b>560 - 599</b> )
<b>B-</b> ( <b>780 - 819</b> )	<b>D-</b> ( <b>501 - 559</b> )
<b>C+</b> ( <b>730 - 779</b> )	<b>E</b> ( <b>≤ 500</b> )

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 7 days after the grade has been posted to voice your concern. After 7 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>.

**Exams:** There will be two regular exams ('Mid-term exams') offered during the semester for AEB3510. Each exam is worth 100 points. The exams will consist of different multiple-choice, essay and math-solving questions. The first exam will be taken entirely in class. The second exam will consist in two parts: a multiple-choice / fill-in-the blank / match questions which will be taken in class, and a take-home part. The math-solving questions will be turned in paper during the exam. The take-home part will be turned back one week after is posted. The exams may be based on material covered in class or material from the book. In particular, about 75% of the exam content will come from the review of concepts and homework. If you solve the homework and the review of concepts questions, you can expect a high likelihood of obtaining all the points of the exams. The exams are rigorous in nature and substantial preparation will be expected and required.

Each in-class exam part is scheduled for 70 minutes and will commence at 8:45 am. The exam dates are specified in this course syllabus (page 3 and also in the next page). There will be a day, one week before the exam, to review the questions from the 'review-of-concept' section. The **review of concepts questions** are mandatory to be solved and delivered the day of the review of the exam, they count towards your final grade and help you to prepare for the examination.

The in-class exams are closed book and closed notes, but a simple calculator is welcomed to be used. You are permitted one cheat-sheet for the exam with all the content you would like to fill in. In addition, the instructor will provide formulas necessary for the exam. Sharing information is not permitted. Cellphones should be turned off as well as other electronic devices. This policy will be STRICTLY enforced during exams. Sharing calculators during an exam is not allowed. Thus, if you do not own a simple calculator, you will need to purchase one. If you are unsure whether or not your calculator is acceptable for use in AEB3510, please consult me as soon as possible.

**Final Exam:** A comprehensive mandatory Final Exam is given during the final exam week, **Wednesday December 12<sup>th</sup> at 10:00 am (!)**. Please make note of the date and the time. The Final Exam will be similar in structure as the other exams. The Final Exam is given in our regular classroom and will last for two hours. All students are required to take the Final Exam and it will count as 150 points of your final course grade. Early or late exams are not given. Please plan accordingly.

**Exam Dates:**

<b>Mid-term Exam 1:</b>	<b>Tuesday September 23 at 8:45 am</b>
<b>Mid-term Exam 2:</b>	
<b>In-class:</b>	<b>Tuesday October 25 at 8:45 am</b>
<b>Take-home due:</b>	<b>Tuesday October 25 at 8:40 am</b>
<b>Final Exam:</b>	<b>Wednesday December 12 at 10:00 am</b>

**The instructor reserves the right to change these dates as appropriate. Any changes will be communicated on E-Learning and via the Gatorlink listserv.**

**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, you will need to talk to your instructor to evaluate the situation.

**Exam day policy:** It is expected that all students be on time to exams. Please arrive five minutes early, if possible, to get seated and get your books/bags stowed away so that the exam can be started 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 classroom during exams and re-enter the classroom. No one will be allowed to enter the classroom to begin the exam after the first student has turned in their finished exam. This policy also applies to the Final Exam.

**Excel Applications:** There will be two cases studies in which we will implement mathematical applications into economics using Excel. One related to linear programming (LP) and one on input-output (IO) problems. Each Excel application is worthy 25 points.

**Laboratories:** Face-to-face lectures will count with laboratories in which the professor will explain the applications of the topic and solve unit-related problems. Students must show that finished the lab at the end of each unit. Each lab from the units is worthy 5 points.

**Homework Assignments:** There will be even take-home homework assignments throughout the semester. Each homework project will be worth 25 points. Thus, for your final course grade, a total of 275 points will be allocated to homework. All assignments must be typed – further information will be provided in class. Late homework submissions will be subtracted 15% if turned the next day and 25% for the second day. After the second day of delay, assignments are no longer accepted and there are no make-up opportunities given. If you need to miss class on the due date, you must turn in your homework via online.

**Review of concepts:** You are required to read the on-line lectures before coming to class, except for the week 1. Each lecture contains questions that helps to refresh and review concepts. There will be about 30 questions that will be dispersed through all the material available for the exam. Each question worth 1 point. The total points that you can earn from the review of concept questions is 30 points. In order to get full credit of the points, you must provide the review of concepts on the Wednesday before the exam (during the Review Exam day which is described in the previous table).

**Assignments:** Each chapter of the book represents a week of classes. About 6 to 7 questions will be considered in every weekly assignment, each homework has a value of 25 points. The questions are based on multiple choice questions, essays, mathematical problems and mini case studies.

**Attendance and participation:** Due to the fast pace of the class, it is encouraged that the students assist to all the classes. Thus, a total of 15 points will be provided to each student as an incentive to come to classes. Each time a student does not come to a class session, unless there is a justifiable absence, 1 point will be taken from the 10 points.

**Professional Etiquette:** In order to provide a productive environment conducive to everyone's learning, adherence to the following guidelines is expected:

- No texting, web surfing, or any other use of cellular devices is permitted or tolerated during class sessions unless it is necessary for the classroom. Please silence your device.
- You can use your tablets or laptops only to take notes for your classes.;
- Students are expected to be on-time for class. It is disruptive when students arrive late – not to mention disrespectful to myself and your fellow students. Coming frequently late to classes will reduce up to 1 point of participation per occasion after the third time;
- Leaving class early without prior permission is not allowed, unless justifiable reasons;
- You should avoid talking amongst each other once the lectures begin (this includes conversations about the material and the class itself). Please raise your hand if you have any questions;

If you cannot comply with these simple expectations, you may be asked to leave the classroom and you will be counted as absent (which is equivalent to subtract up to 1 point of attendance and participation). The instructor reserves the right to penalize any student violating these rules.

**Pre-lab assignments:** Each chapter in the mini-book is accompanied by numerous problems. In order to motivate reading before the chapters before the class, and considering that the material will be available online five days before the classes, there will be pre-lab assignments to reinforce the material. This will be simple problems that will help to improve your skills. The questions are contained in each unit of the mini-book. They must be solved before every Tuesday at 9:00 am. Failing to submit the pre-lab assignment before the class session will be punished with 0 points. The solutions of the pre-labs are found inside the lectures of the mini-book, it is your task to follow these steps and answer the problems of the pre-lab accordingly. There will also be online videos that can support the homework depending on the available time.

**Online 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. These evaluations are conducted online at <https://evaluations.ufl.edu>. Evaluations are typically open for students to complete during the last two or three 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>

## **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/](http://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](http://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](http://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 a 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.

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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](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 😊**