

AEB 4931: Special Topics in FRE (Computational Analysis in FRE)

Spring 2025

Instructor: Prof. Patrick S. Ward

Lecture: Friday 9:35 – 10:25 AM

Office hours: Tuesday 9:00 – 10:00 AM
Thursday 9:00 – 10:00 AM

Email: wardp@ufl.edu

Lecture location: Turlington 005

Office hour location: McCarty B 1121

Phone: (352) 294-9050

Course Description: This course is designed to be taken concurrently with (and is meant to complement) AEB 3510 (Quantitative Methods in Food and Resource Economics). In this course, students will learn basic computer programming skills to numerically (and in some cases analytically) solve complex quantitative problems like those economic and business decision makers confront on a regular basis. This course is designed to enhance understanding of finite mathematical tools introduced in AEB 3510 by learning how to use the R computer programming language to perform operations that would otherwise be done by hand.

Credits: 1

Grading scheme: Letter grade

Prerequisites: You must be concurrently enrolled in AEB 3510 or have previously completed AEB 3510 (or equivalent course) prior to enrolling in this special topics course.

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 class exercises, I will not provide assistance on 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:

Mr. Trey Gifford; 1170B McCarty Hall A; (352) 294-7640;

E-mail: agifford1@ufl.edu. Office Hours: [By appointment](#)

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

Course motivation (or, “Why you should be excited about taking this course”): As mentioned in the syllabus for AEB 3510, 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 integration of computer programming further highlights those similarities, while also encouraging

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students to think logically about structuring programs and the programming syntax with which to solve those problems. The integration of computer programming is more of a complement and an enhancement of the mathematical principles of linear algebra and calculus, and not so much as a replacement for the basic skills. This course uses the R programming language in lieu of more traditional mathematical programming languages such as Matlab or Mathematica for several reasons. First and foremost, R is an open source (and hence freely available) programming environment, and consequently, is widely used both inside and outside academia. Second, and relatedly, because there is such a rich and vibrant user community, and many users are also package developers, there is constantly an influx of new tools for data and computational analysis. Third, this course is the first in a series of courses added into the FRE curriculum for our recently-approved minor in Data Analytics for Applied Economics and Agribusiness, and since other courses will be using the R programming language for data analysis and machine learning, it makes sense to have a course that introduces R and some of its computational capabilities before moving on to these more advanced topic areas.

Expected Student Learning Outcomes: After the successful completion of AEB 4931, a typical student should be able to:

- Apply basic R programming skills to solve complex mathematical problems common in food and resource economics, including (but not limited to) solving systems of linear equations, graphing linear and nonlinear functions, performing marginal analysis by computing and evaluating derivatives, and solving optimization problems.
- Critically interpret the output of R analysis in the context of economic theory and real world applications
- Prepare dynamic documents with reproducible analysis using R Markdown

Course Materials:

- **Optional Texts:**
 - *Linear algebra and its applications with R*, by Ruriko Yoshida
 - *Applied calculus with R*, by Thomas J. Pfaff
- **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 material and links to other resources 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.
- **Instructional materials:** Instructional materials for this course consist of only those materials specifically reviewed, selected, and assigned by the instructor. The instructor is only responsible for these instructional materials.
- **Other:** Students are expected to have or develop a basic knowledge of mathematics as well as the use of computational tools (namely R) for applying mathematical concepts. **If students encounter challenges with R, they are encouraged to search for tutorials on YouTube (there are many available) or – my personal favorites – Stack Overflow (stackoverflow.com) or Cross Validated (stats.stackexchange.com), though the instructor does not attest to the reliability of these external resources.**

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Class Structure: The class format is that of a computer lab. Students are expected to bring their laptops to every lab session (fully charged). Lab sessions are frequently designed to build on the material covered in AEB 3510, so students should request the course materials for each module if the two courses are not being taken concurrently.

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.

Exercises: These are meant to give you opportunities to master the programming skills and computational analytic methods that we will discuss in the weekly course meetings. There will be 8 exercises 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 exercises are structured in somewhat of a scaffolded framework, and it is important that you master the material in a sequential fashion to ensure a solid foundation. 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.

Exams: There will be two exams over the course of the semester. The midterm exam will be held in class on March 7, 2025. The final exam will be held on May 2, 2025 (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 and its applications in R. The final exam will primarily focus on the concepts and methods from the second half of the semester, primarily calculus and its applications in R. Both exams will require programming in R, so students are expected to bring their (fully charged) laptops to class on the exam days.

Composition of Final Score:

Course Assignments	Total Points
Attendance	50 pts
Participation	50 pts
Problem sets (8)	400 pts (50 pts each)
Midterm exam I (March 7, 2025)	100 pts
Midterm exam II (May 2, 2025, 10:00 AM – 12:00 PM)	100 pts
Total	700 pts

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,

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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

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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](#) 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

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Tentative Weekly Schedule:

Week	Date	Content
1	January 17	Introduction to R and RStudio
2	January 24	Basic computational operations in R
3	January 31	Documenting results in R Markdown
4	February 7	Graphing linear functions
5	February 14	Solving systems of linear equations
6	February 21	Matrix algebra
7	February 28	Equilibrium displacement modeling
8	March 7	Midterm exam
9	March 14	Writing and graphing nonlinear functions
10	March 21	Spring Break
11	March 28	Calculating and evaluating derivatives
12	April 4	Finding extreme values
13	April 11	Testing first- and second-order conditions
14	April 18	Constrained optimization
	May 2	Final 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!*****