ABE205 Biosystems Analysis and Design

Shantz 338, MW, 2-5 or 5-8 pm Spring 2017

Description of Course

Introduction to Excel, Visual Basic in Excel, Python, and Matlab with an emphasis on statistics, regression, conditional statements, loops, functions and subroutines, forms, arrays, Euler method, data acquisition, numerical methods, and symbolic processing. Students can choose to work in Google Sheets/Appscript instead of Excel/VBA.

Course Prerequisites or Co-requisites

College of Engineering Majors only. Calculus I.

Instructor and Contact Information

Peter Waller, Shantz 536, 520-440-5803, pwaller@email.arizona.edu

Monday 1-2/"Open Door Policy"

Teaching assistants: none

Course is conducted in D2L. All videos, pdfs, homeworks, and exams are in D2L.

Course Format and Teaching Methods

There are two laboratories per week, MW 2-5 and one hour of online lecture per week. The course uses the flipped classroom approach with laboratories focused on student completion of homework.

Course Objectives and Expected Learning Outcomes

Course objectives

This class enables students to use the following computational methods and techniques in Excel/VBA or Google Sheets/Appscript, and Matlab: statistics, regression, conditional statements, loops, functions and subroutines, forms, arrays, Euler method, data acquisition, numerical methods, and symbolic processing. Students learn how to run Excel/VBA scripts from Python. At the completion of the course, students should feel comfortable making engineering computations in spreadsheets and computer programs.

Learning objectives

- Students conduct engineering computations in Excel/VBA or Google Sheets/Appscript, and Matlab
- Students use Python to run Excel/VBA subroutines.
- Students write programs with conditional statements, dimensioning, loops and other basic programming techniques.
- Students graph, conduct iteration, regression, statistical analysis, linear programming, and other numerical techniques in spreadsheets.

Absence and Class Participation Policy

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, http://policy.arizona.edu/human-resources/religious-accommodation-policy.

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: https://deanofstudents.arizona.edu/absences

Participating in the laboratories is recommended but not required. Students must attend at least one laboratory per week, and attendance is recorded for up to 5% extra credit. It is critical that you coordinate laboratory attendance with fellow group members. Failure to submit third-party documentation will result in unexcused absences.

Makeup Policy for Students Who Register Late

Students who sign up late for the class cannot make up assignments.

Course Communications

All course communications will be conducted with UA e-mail address, and D2L

Required Texts or Readings

Online pdfs are available in D2L for the Excel/VBA and Google Sheets/Appscript assignments.

Please purchase. *A Concise Introduction to Matlab*. William Palm III (ISBN: 978-0-07338583-9).

Required or Special Materials

Students can conduct all assignments on classroom computers. Please bring earphones if you plan to listen to the online lectures in class.

Required Extracurricular Activities (if any)

There are no required extracurricular activities.

Assignments and Examinations: Schedule/Due Dates

Each chapter has an associated homework/quiz assignment and online lectures. There are 11 pdf chapters in Excel/VBA or Google Sheets/Appscript and 8 chapters in the Matlab book. You will turn in a D2L Quiz, and you will turn in the associated worksheet or Matlab code in a document to the Dropbox. Some quiz questions are T/F and others are assigned problems. In the quiz, if you complete the problem, then you will mark True. We periodically check quizzes for reporting accuracy by comparing the quiz claim to the homework turned into the D2L Dropbox. Quiz submission and the homework in the drop box are due at 11:59 pm on the due date. If you are working in Google Sheets, download your Google Sheet as an Excel file and turn into the dropbox. Copy your code to a word document. Your lowest score homework will be dropped, to account for sickness or unexpected events. Questions are randomized, and you are allowed two chances on each quiz.

There are four exams. Two exams cover Excel/VBA or Google Sheets/Appscript. Two exams cover Matlab.

One group project will be conducted by groups of 2 or more students. The project is flexible and is planned in consultation with the instructor, based on student skills

and interests. In general, students will develop a website and place information on the web. It is expected that each student will spend approximately 20 hours on the project.

The last midterm will serve as the final exam. Exams are given in lab, cover an entire lab period and require students to solve problems on the computer. You should feel comfortable with programming because you will need to solve problems quickly on the exam. This is a completely different skill than memorizing information for an exam or even memorizing how to do math problems. You should practice solving problems with VBA/Excel and Matlab as much as possible.

Final Examination or Project

The final exams take place from 3-5 pm and 5-7 pm on the regularly scheduled exam date.

Grading Scale and Policies

Component	Percentage
Project	10
Wednesday attendance (5 extra credit points)	5
Assignments	30
Midterms and Final (15 points each)	60

Grades will be assigned according to the following grade scale

A	90 – 100%
B	80 – 90%
C	65 – 80%
D	50 – 65%

University policy regarding grades and grading systems is available at http://catalog.arizona.edu/policy/grades-and-grading-system

Requests for incomplete (I) or withdrawal (W) must be made in accordance with University policies, which are available at http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete and http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal respectively.

Dispute of Grade Policy Students are welcome to dispute a grade on a quiz, project, or exam at any time during the semester.

Honors Credit

Students wishing to contract this course for Honors Credit should email me to set up an appointment to discuss the terms of the contact. Information on Honors Contracts can be found at http://www.honors.arizona.edu/faculty-and-advisors/contracts.

Scheduled Topics/Activities

Due Date (11:59 pm)	Chapter	Topic
Wed, Jan 18	Ch 2	Iteration and Solver (alternate Javascript badge)
Fri, Jan 20	Ch 3	Statistical simulation (alternate Javascript badge)
Mon, Jan 23	Ch 4	Regression (only do columns in Google Sheets) also GS Tut.
Wed, Jan 25	Ch 5	Internet data acquisition and modeling (Google sheets)
Mon, Jan 30	Ch 6	Linear programming and Solver (Google sheets add in)
Wed, Feb 1	Exam	Wednesday, Midterm, 3-5 pm Excel or GS Chapters 2-6
Wed, Feb 3	Ch 7	VLookup and Interpolation (OK in Google sheets)
Mon, Feb 6	Ch 8	Arrays and data processing (OK in Google sheets)
Mon, Feb 13	Ch 9	Forms (Alternate assignment in Google sheets)
Mon, Feb 20	Ch 10	2-D arrays and nested loops (OK in Google sheets)
Mon, Feb 27	Ch 11	Time and Space (OK on Google sheets)
Wed, Mar 1	Exam	Wednesday, Midterm, 3-5 pm Excel or GS Chapters 7-11
Mon, Mar 6	Ch 1	Matlab – Overview of MATLAB
Mon, Mar 20	Ch 2	Matlab – Numeric, Cell, and Structure Arrays
Mon, Mar 20		Project due (website and coding)
Mon, Mar 27	Ch 3	Matlab – Functions and Files
Mon, Apr 3	Ch 4	Matlab – Decision Making Programs
Wed, Apr 5	Mar 10	Wednesday, Midterm, 3-5 pm MATLAB Chapters 1-4
Mon, Apr 10	Ch 5	Matlab – Plotting and Model Building
Mon, Apr 17	Ch 6	Matlab – Statistics, Probability and Interpolation
Mon, Apr 24	Ch 7	Matlab – Numerical Methods for Calculus and Diff Eq.
Mon, May 1	Ch 8	Matlab – Symbolic Processing
Mon, Mar 8	Final	Monday, Final 3-5 pm MATLAB Chapters 5-8

Classroom Behavior Policy

To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (e.g., texting, chatting, reading a newspaper, making phone calls, web surfing, etc.).

Students are asked to refrain from disruptive conversations with people sitting around them during lecture. Students observed engaging in disruptive activity will be asked to cease this behavior. Those who continue to disrupt the class will be asked to leave lecture or discussion and may be reported to the Dean of Students.

There are no restrictions on phones or computers in this class. However, during exams, no cell phone use is allowed.

Threatening Behavior Policy

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students.

Accessibility and Accommodations

Our goal in this classroom is that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please let me know immediately so that we can discuss options. You are also welcome to contact the Disability Resource Center (520-621-3268) to establish reasonable accommodations. For additional information on the Disability Resource Center and reasonable accommodations, please visit http://drc.arizona.edu.

If you have reasonable accommodations, please plan to meet with me by appointment or during office hours to discuss accommodations and how my course requirements and activities may impact your ability to fully participate.

Please be aware that the accessible table and chairs in this room should remain available for students who find that standard classroom seating is not usable.

Code of Academic Integrity

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity.

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student e-mail addresses. This conduct may also constitute copyright infringement.

UA Nondiscrimination and Anti-harassment Policy

The University is committed to creating and maintaining an environment free of discrimination; see http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy

Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Additional Resources for Students

UA Academic policies and procedures are available at http://catalog.arizona.edu/policies

Student Assistance and Advocacy information is available at http://deanofstudents.arizona.edu/student-assistance/students/student-assistance

Confidentiality of Student Records

http://www.registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa?topic=ferpa

Subject to Change Statement

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.