440:127 – Introduction to Computers for Engineers – Spring 2015

Course Description:

This course is an introduction to MATLAB, a powerful programming language and development environment for engineers and scientists. Programming concepts in MATLAB are illustrated with various engineering application examples.

Text:

H. Moore, *MATLAB for Engineers*, 4th ed., 2014, Prentice Hall, ISBN-13: 978-0133485974.

Software:

MATLAB is installed in the BEST computer labs (BST-111), the DSV and EIT Labs (ENG-B125, ENG-D110), and at the ARC Computing Center. All recitations will meet at BEST labs.

To be able to work at home, students may purchase (recommended but not required) the student edition of MATLAB from: `http://www.mathworks.com/academia/student_version/` (MATLAB + Simulink option is best).

Login at BEST labs is with your RU NetID. To be able to use the PCs in the engineering building (DSV and EIT Labs), you will need to get a School-of-Engineering computer account – please contact the SOE staff listed on `http://ecs.rutgers.edu/`.

Online Course Materials:

Class announcements, lecture notes, homework assignments, example programs and solutions, web links and other course resources, are accessible online at:

    http://sakai.rutgers.edu

To get access, you must have a NetID and must be registered in the course.

Course Schedule:

Week	Topics	Text
Week 1 – Jan. 19	Basics – variables, arrays, matrices, plotting, I/O	Ch. 2 & 3, Sect. 5.1, 7.2
Week 2 – Jan. 26	Basics – operators, functions, strings, cells	Ch. 2 & 3, Sect. 11.3, 11.4
Week 3 – Feb. 2	Matrices	Ch. 4
Week 4 – Feb. 9	Plotting	Ch. 5
Week 5 – Feb. 16	User-defined functions	Ch. 6
Week 6 – Feb. 23	Input-output formatting — **Exam 1**	Ch. 7
Week 7 – Mar. 2	Relational and logical operations	Ch. 8
Week 8 – Mar. 9	Loops	Ch. 9
– Mar. 17	—	—
Week 9 – Mar. 23	Review for weeks 5–8	Ch. 6–9
Week 10 – Mar. 30	Matrix algebra – solving linear equations — **Exam 2**	Ch. 10
Week 11 – Apr. 6	Numerical methods, part 1	Ch. 13
Week 12 – Apr. 13	Numerical methods, part 2	Ch. 13
Week 13 – Apr. 20	Strings, cell arrays, and structures	Ch. 11
Week 14 – Apr. 27	**Exam 3**	

This subject to revisions. Please see Sakai Announcements for detailed Reading Schedule each week.

Prerequisites:

None, but some prior programming experience is helpful.

Course Requirements:

The final grade is based on three exams, recitation work, and recitation attendance:

1. Exam 1, week of Feb. 23, 2015 $30 \pm 5\%$
2. Exam 2, week of Mar. 30, 2015 $30 \pm 5\%$
3. Exam 3, week of Apr. 27, 2015 $30 \pm 5\%$
4. Recitation work $10 \pm 5\%$
5. Recitation attendance (mandatory) $-x$

where x depends in a complicated manner on the number of recitation absences (e.g., the more absences, the more points are lost per absence) and will be subtracted from the percentage score of exams and recitation work, and potentially lower your course letter grade. Five or more absences from recitations will result in an automatic "F" in the course regardless of your exam grades (even if they are 100).

The following grading scale is subject to change, but it will help you gauge your class standing after each exam:

Grading Scale	
91–100	A
86–90	B+
76–85	B
71–75	C+
61–70	C
51–60	D
0-50	F

The grading formula is as follows (expressed in Matlab language):

```
G = sum((A==1).*R)/10 + 0.3*sum(E) - x
```

Example calculation: Suppose your recitation attendances and grades, and exam grades are:

```
A = [1, 0, 1, 1, 0, 1, 0, 1, 1, 1]      % 1 = present, 0 = absent
R = [9, 10, 8, 7, 10, 9, 10, 9, 8, 6]   % each graded on 0-10 scale
E = [90, 82, 80]                        % each graded on 0-100 scale
```

and that your three recitation absences correspond to an $x = 12$ point penalty, then your course grade calculated with and without recitation absences will be:

```
x=12;  G = 69.2 ==> C      % using A = [1, 0, 1, 1, 0, 1, 0, 1, 1, 1]
x= 0;  G = 81.2 ==> B;     % using A = [1, 1, 1, 1, 1, 1, 1, 1, 1, 1]
```

As you see, you have lost two letter grades because of the recitation absences. Note also that the three recitation 10's did not count because you were absent during those days. In other words, you were penalized twice, having a lower recitation mean and losing the x-points.

Please note that the above grading formula and grade thresholds are subject to change, and cannot be firmly decided before all course data are in at the end of the term.

Recitation & Homework Requirements:

Attendance in the weekly recitation sessions is *required*. You may attend only the recitation session in which you are registered. You must attend the *entire* class period. You should not arrive late or leave early from your recitation session. Missed or partially attended recitations will count *negatively* on your final grade. All recitations meet in room BST-111 at BEST Computer Labs at BEST West Residence Hall (54 Bevier Road).

During recitations, you will be doing hands-on MATLAB exercises, and soon following the recitation session (*within 48 hrs*), you must write up and *upload* your code to Sakai Assignments–2.

You are responsible for verifying that your work was uploaded successfully and to the right place on Sakai. Any uploading problems must be resolved within your allotted 48-hour period (the most common uploading problem is to forget to press the final SUBMIT button or uploading unreadable files with a .MAT extension). The recommended uploading format will be explained by your TAs.

Uploaded recitation work will count towards the recitation grade *only if* the student was present during the corresponding recitation session. Please always remember to sign the attendance sheet during recitations.

Homework problems are a required and essential part of the course. Homework problems will be assigned each week, but will not be collected or graded. These problems provide additional practice and illustrate the use of MATLAB in engineering. It is very strongly recommended that you work on the problems on your own without looking at the supplied solutions (feel free to email your instructor or TAs for hints.)

You are expected to spend several hours a week (e.g., 4–8 hrs) working on the homework problems. Questions based on but not identical to the homework problems are asked in exams and you may lose a large percentage of your exam grade if you have not worked on the homework problems (simply reading or memorizing the solutions prior to exams will not work.)

Also, please note that exams are cumulative and closed-book and will be given at BEST labs during your scheduled recitation times. Exams must be taken on your *scheduled* recitation session and you *may not switch* exam sections. Moreover, students must follow the prescribed seating patterns for each exam. Please also bring your RU photo ID and make sure that you sign the attendance sheet.

How to Study:

The only way to learn MATLAB is by doing. This requires a lot of practice writing programs, making errors, and correcting them. Passive reading will not get you far. The best way to study for this course is to do the following in that order:

a. Read the lecture notes for the week, practicing (i.e. entering them into MATLAB) with all the small examples given there.

b. Read the assigned chapter from the textbook, and do all the book examples as you move along, including all the examples labeled "Practice Exercises".

c. Then, do the assigned homework problems without looking at the given solutions. Homeworks are an essential part of the exam material.

d. The recitations are the most important part of the course where students get the chance to practice with the concepts discussed in class. It is strongly recommended that you start working on the recitations several days *before* your recitation session.

e. Tutoring sessions will be available at the ARC learning center – for the schedules please see the RU Learning Center web site: `http://rlc.rutgers.edu/`. Study groups may also become available through the Learning Center.

Academic Integrity:

Students must work alone on their recitation projects. It is taken for granted that students *accept and adhere* to the Rutgers academic integrity policy described in:

`http://academicintegrity.rutgers.edu/`

Students *must sign-in* with their RU photo ID at each recitation session and at exams. Please note also that cell phones and other wireless devices are *not allowed* during lectures and recitations or during exams. Students must leave their *cell phones* with the TAs when going to the restrooms during exams. The use of laptops in lectures is initially allowed, however their use will be banned if they prove to be too disruptive.

Self-Reported Absences

Please note that submission of online forms for self-reported absences does not constitute an excuse for absence (please read carefully the instructions that accompany the online forms). For self-reported absences to be considered at all you must do the following:

1. Contact me immediately by email explaining the reasons for the absence.
2. Provide me with verifiable documentation justifying your absence.
3. Submit the same documentation to Dean Patricia Muisener's office (ENG-B100). Once they verify it and approve it, they will issue a letter of excuse to be sent to me (you can email it to me).
4. Send me a copy of your schedule, your recitation section, and TA's name so that alternative arrangements can be made. Because time is of the essence, you must contact me ASAP regarding such arrangements, even if the Dean's letter is not yet available.

Students with Disabilities:

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability *must contact* the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. To begin this process, please complete the Registration form on the ODS web site at:

```
https://ods.rutgers.edu/students/registration-form
https://ods.rutgers.edu/students/documentation-guidelines
```

Please note that requests for exam accommodations must be submitted, separately for *each exam*, to the ODS office at least *five working days* prior to the exam, otherwise, the ODS office will not process your request.

Recitation Sections:

Please make sure you attend the class lecture and recitation section in which you are registered. Lectures are in SEC-111 on Wednesdays, 8:40–10:00 AM for sections 1–6, and on Wednesdays, 12:00–1:20 PM for sections 7–12. Lectures will begin on Jan. 21, and recitations in the week of Jan. 26, 2015. Recitations will always meet in the BEST computer labs according to the following schedule:

section		time	TA
Section 03	M	10:20 – 11:40 AM	Pengcheng Wang
Section 07	M	12:00 – 01:20 PM	Hafiz Imtiaz
Section 01	M	01:40 – 03:00 PM	Hafiz Imtiaz
Section 05	T	01:40 – 03:00 PM	Yulong Yang
Section 08	T	05:00 – 06:20 PM	Pengcheng Wang
Section 06	W	10:20 – 11:40 AM	Riyanka Pai
Section 02	Th	01:40 – 03:00 PM	Riyanka Pai
Section 04	Th	05:00 – 06:20 PM	Young Lee
Section 09	F	08:40 – 10:00 AM	Hajar Mahdavi-Doost
Section 10	F	12:00 – 01:20 PM	Hajar Mahdavi-Doost
Section 11	F	01:40 – 03:00 PM	Yulong Yang
Section 12	F	03:20 – 04:40 PM	Young Lee

Instructor:

Sophocles J. Orfanidis
Electrical & Computer Engineering Department
Room EE-230, Tel. 732-445-5017, email: orfanidi@ece.rutgers.edu.
Office hours: W, 2:00 – 4:00 PM

Teaching Assistants:

Hafiz Imtiaz, email: `hafiz.imtiaz@rutgers.edu`
ECE Dept., Room: Electrical Engineering, EE-209, Hours: M, 3:00–5:00 PM

Young Lee, email: `apple205@scarletmail.rutgers.edu`
ECE Dept., CoRE Bldg., Room: CORE-731, Hours: Th, 2:30–4:30 PM

Hajar Mahdavi-Doost, email: `hajarmahdavi@gmail.com`
ECE Dept., Room: Electrical Engineering, EE-209, Hours: F, 10:00 AM – 12:00 PM

Riyanka Pai, email: `riyankapai@gmail.com`
MSE Dept., Room: Center for Ceramic Research, CCR-241, Hours: T, 9:40–11:40 AM

Yulong Yang, email: `yy231@scarletmail.rutgers.edu`
ECE Dept., Room: Electrical Engineering, EE-118, Hours: M, 1:00–3:00 PM

Pengcheng Wang, email: `mechaerowpc@gmail.com`
MAE Dept., Room: School of Engineering, ENG-D115, Hours: F, 3:00–5:00 PM