Syllabus

1.1 Instructor Information

Instructor:	Dr. Bevin Maultsby
Moodle Page:	`https://moodle-courses1718.wolfware.ncsu.edu/course/view.php?id=51`
Communication:	Moodle will be used for most communications in this course. In particular, math/coding questions should be asked in class, in office hours, or on the Moodle forum. You are encouraged to discuss concepts and homework (with discretion) in the Moodle forum.
Office Hours:	– Tuesday 12:40–1:40pm – Thursday 2:50–3:50pm – Friday 10:15–11:15am – by appointment There is ample time in class to work on assignments and ask me questions; however, please restrict confidential matters (grades, etc.) to office hours.
Office:	SAS Hall 3230
Class:	TR, 10:15am–11:30am in Cox Hall 105
Instructor Contact:	bmaults@ncsu.edu, 919-515-1876 (no voicemail)

1.2 Course prerequisites or restrictive statements.

Prerequisite: MA 141, and E 115 (or equivalent)
Corequisite: MA 241

1.3 GEP Designation

This class does not satisfy a GEP requirement.

1.4 Textbook Information

Required: *Matlab for Engineers* by Holly Moore, 3rd or 4th Edition, ISBN 9780133485974.

Recommended: You will use the classroom computers for Matlab. In addition, I encourage you to install a recent version of Matlab on your own computer. The Student Version is available at

`https://software.ncsu.edu/student/`

1.5 Course Description

Computer-based mathematical problem solving and simulation techniques using MATLAB. Emphasizes scientific programming constructs that utilize good practices in code development, including documentation and style. Covers user-defined functions, data abstractions, data visualization and appropriate use of pre-defined functions. Applications are from science and engineering.

1.6 Learning Outcomes

This is an introduction to elementary programming concepts with mathematical problem solving. Starting with a problem suitable for mathematical analysis, students will be able to analyze the problem, and either identify appropriate Matlab tools to solve the problem, or create new tools. Scientific visualization is included.

Outcomes: See § 1.7.2 for a list of the 16 major learning outcomes. These outcomes are grouped into four large topics which may be characterized by

A. Using Matlab to set up and solve standard math problems.

B. Writing user-defined functions to perform tasks and solve problems with flexible input. Communication between the program and the user is emphasized.

C. Selecting and using programming control-flow constructs that include

   - relational and logical operators
   - if-then-else (and switch)
   - for-loops
   - while-loops
   - nesting control-flow constructs.

D. Numerical approaches to problem solving.

1.7 Course Structure

1.7.1 Projects.

There are four projects, each viewed as an expanded homework problem. Each project description will be posted on Moodle with a rubric to determine your project grade.

Each project submission consists of an m-file (submitted through Moodle) as well as a written description of how your code works and why it answers the given prompt. Projects are graded out of 100 points. You will collaborate closely with 1-2 other student(s) on each project and submit

one project for all students with all names on it. *Collaboration is required; otherwise 10 points will be deducted from your project score.*

1.7.2 Tests and the Final Exam.

This course uses a mastery-based approach to testing. Your test score will depend on your ability to show mastery of 16 total "outcomes" (aka objectives, skills, competencies):

Number	Outcome Name	Chapter	Test Opportunities (5 = Final)
#1	Array operations	2	1, 2, 5
#2	Built-in functions	3	1, 2, 5
#3	Advanced problem solving	4	1, 2, 5
#4	Basic plotting	5	1, 2, 5
#5	Advanced plotting	5 (14)	2, 3, 5
#6	Function m-files	6	2, 3, 5
#7	Anonymous functions	6	2, 3, 5
#8	Input and output	7	2, 3, 5
#9	Relational and logical operators, logical functions	8	3, 4, 5
#10	Selection structures	8	3, 4, 5
#11	Repetitive structures	9	3, 4, 5
#12	Large loops/nesting	9	3, 4, 5
#13	Systems of linear equations	10	4, 5
#14	Interpolation and curve fitting	13	4, 5
#15	Numerical differentiation and integration	13	4, 5
#16	Differential equations	13	4, 5

Each skill may be tested with several questions. There is no partial credit–you either show mastery of the outcome (as determined by me) or you do not. Once you have demonstrated mastery of a skill, you do not need to attempt questions which test explicitly for that particular skill on future tests. You should think of each test as an opportunity to demonstrate that you have mastered a skill.

Tests will be in-class coding assignments submitted via Moodle. **You must use the classroom computers (and not your own laptop) for the tests.**

- The first test will check for mastery of skills 1-4. You will not receive a typical grade like 82%, but rather a report on your skills, e.g.

#1 Array operations	Competent
#2 Built-in functions	Not yet competent
#3 Advanced problem solving	Competent
#4 Basic plotting	Competent

  This sample report indicates that this student needs to work harder on built-in functions. S/he would have a chance on test 2 and on the final to demonstrate mastery of built-in functions. **There is no penalty for "late mastery."**

- The second test will check for mastery of skills 5-8. *If you have not yet shown mastery of any of skills 1-4, you have a chance to demonstrate those skills on test 2.*
- The third test will check for mastery of skills 9-12. *If you have not yet shown mastery of any of skills 5-8, you have a chance to demonstrate those skills on test 3.*
- The fourth test will check for mastery of skills 13-16. *If you have not yet shown mastery of any of skills 9-12, you have a chance to demonstrate those skills on test 4.*
- The fifth test/final exam will have a section for each of the 16 outcomes. If you are missing any outcomes, you can demonstrate mastery of those missing outcomes on the final. You do not need to re-demonstrate mastery of previous outcomes.

Your semester test score is the number of outcomes you have mastered divided by 16.

Examples.

A. Alice is an experienced coder who has used Matlab before. She demonstrates mastery of outcomes 1-4 on the first test, outcomes 5-8 on the second test, and outcomes 9-12 on the third test, and outcomes 13-16 on the fourth test. Therefore, her test score is 100 and she does not take the final exam.

B. Bob is new to Matlab. On the first test, he masters outcomes 2-4, but misses an array operations question. On the second test, he attempts the questions relevant to outcomes 1 and 5-8. Going into the final, he is missing outcomes 7, 11, 12, and 16. Therefore, on the final exam he attempts the four sets of questions pertaining to those outcomes.

   - If Bob does not take the final or does not show mastery of any of the four needed outcomes, his test score is 75.
   - If Bob shows mastery of 1 skill, his test score improves to 81.25.

…	2 skills,	…	87.5.
…	3 skills,	…	93.75.
…	4 skills,	…	100.

C. Chelsea demonstrates mastery of outcomes 1, 3 and 4 on the first test. Unfortunately, she is sick on the day of the second test and does not take it. She decides to focus on outcomes 5-10 for test 3 and outcomes 11-16 for test 4. She has a chance to redo outcome #2 on the final.

D. David skips tests 1-4 (**not recommended**). On the final, he demonstrates mastery of 10 out of 16 outcomes. His semester test score is a 62.5.

Tests are typically based on in-class exercises, the practice problems, and the projects. If you do not do the practice problems, it is unlikely that you will do well on the tests.

1.8 Projected Schedule

We will cover approximately 1-2 chapters per week:

Course introduction, Ch 1.
Ch 2. Matlab Environment
Ch 3. Functions
Ch 4. Matrices
Ch 5. Plotting
Ch 6. User-Defined Functions
Ch 7. User-controlled Input and Output
Ch 8. Logical Functions and Selection Structures
Ch 9. Repetition Structures
Ch 10. Matrix Algebra
Ch 11. Other Kinds of Arrays (overview only)
Ch 12. Symbolic Mathematics (overview only)
Ch 13. Numerical Techniques
Ch 14. Advanced Graphics (brief)

There will be weekly recommended homework/practice problems which will not be collected. These problems will provide preparation for each test.

There will be 4 tests. These tests are scheduled for

- Tuesday, 9/5
- Tuesday, 9/26
- Thursday, 10/26
- Tuesday, 11/21

I may change these dates, but each date will be announced on Moodle before the test.

There will be 4 projects. The tentative due dates for these projects are

- 8/31
- 9/21
- 11/2
- 11/30 (Last day of class)

Final Exam: Thursday, 12/7/2017, from 8:00–11:00am in Cox 105. This date/time is firm.

1.9 Statement on transportation

Not applicable.

1.10 Statement on safety and risk assumption

Not applicable.

1.11 How grades are determined

Your course grade will be determined as follows:

Weight	Type of Assignment
50%	Test Score
10%	Project 1
10%	Project 2
15 %	Project 3
15 %	Project 4

Your grades will be tracked on Moodle. The final grade will be assigned using the plus/minus grading system according to the following chart:

A+ : 98–100	A : 93–97.99	A– : 90–92.99
B+ : 88–100	B : 83–87.99	B– : 80–82.99
C+ : 78–100	C : 73–77.99	C– : 70–72.99
D+ : 68–100	D : 63–67.99	D– : 60–62.99
	F : 0–59.99	

For example, a score of 87.56 is a B, not a B+.

1.12 Policy on incomplete grades and late assignments

As projects involve collaboration of 2–3 students, in general no late projects will be accepted.

However, if a student misses several classes due to a hospital stay or other documented and excused reason, an individual project may be graded for full credit if it is submitted within one week of the student's return to class.

Individual projects which are late without a documented and excused absence will be graded out of a maximum of 60 points.

1.13 Policy on attendance

As this is a 100-level course, attendance is taken. For complete attendance and excused absence policies, please see `http://policies.ncsu.edu/regulation/reg-02-20-03`. All excused absences must be documented.

1.14 Academic Integrity

Students are required to comply with the university policy on academic integrity found in the Code of Student Conduct found at `http://policies.ncsu.edu/policy/pol-11-35-01`.

Examinations: Students will neither give nor receive any assistance on any test or the final exam. Use of cell phones during exams is not permitted. Accessing social media is not permitted (email, Facebook, etc.). Students may be assigned seats for quizzes and/or exams.

Homework: You are expected to work together on the practice problems, and also to seek assistance from people like the instructor and the Matlab consultants in SAS 2103.

Projects: You will work closely in groups of up to 3 on each project and submit one project through Moodle, including the names of all group members as the "authors" of the project.

If you consult with students outside your group, include the names of the people you consulted with. This includes people you give help to and people that you receive help from. You are welcome to seek assistance from the instructor, but you should not seek help from the Matlab consultants or the internet on projects.

Omission of names of people you work with or people you consult will be considered a violation of academic integrity.

Utilization of the Honor Pledge: All examinations must be completed independent of assistance from other people. Your signature on any test or assignment indicates "I have neither given nor received unauthorized aid on this test or assignment."

Penalty for violations: Any violation of this policy will be reported to the Office of Student Con-

duct with a recommendation of a failing grade for the assignment and/or course.

1.15 Non-discrimination Policy

NC State University provides equality of opportunity in education and employment for all students and employees. Accordingly, NC State affirms its commitment to maintain a work environment for all employees and an academic environment for all students that is free from all forms of discrimination. Discrimination based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation is a violation of state and federal law and/or NC State University policy and will not be tolerated. Harassment of any person (either in the form of quid pro quo or creation of a hostile environment) based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation also is a violation of state and federal law and/or NC State University policy and will not be tolerated. Retaliation against any person who complains about discrimination is also prohibited. NC State's policies and regulations covering discrimination, harassment, and retaliation may be accessed at `http://policies.ncsu.edu/policy/pol-04-25-05` or `http://www.ncsu.edu/equal_op/`. Any person who feels that he or she has been the subject of prohibited discrimination, harassment, or retaliation should contact the Office for Equal Opportunity (OEO) at 919-515-3148.

1.16 Statement for students with disabilities

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with the Disability Services Office at Suite 2221, Student Health Center, Campus Box 7509, 919-515-7653. For more information on NC States policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation (REG02.20.01) (`https://policies.ncsu.edu/regulation/reg-02-20-01/`).

1.17 Electronic Course Components

Please be advised this course may be recorded for current and potential future educational purposes. By your continued participation in this recorded course, you are providing your permission to be recorded.

The course site for the class is Moodle and the software used in class is Matlab. Any posts you make to the forum may be seen by other students in the class.

Instructor is not responsible for ensuring privacy or accessibility of electronic materials that are not required components of the course (e.g., links to supplemental information that is not part of the required reading list).

Required statement: "Students may be required to disclose personally identifiable information to other students in the course, via electronic tools like email or web-postings, where relevant to

the course. Examples include online discussions of class topics, and posting of student course-work. All students are expected to respect the privacy of each other by not sharing or using such information outside the course."

1.18 For Your Reference

Students are responsible for reviewing the NC State University PRRs which pertains to their course rights and responsibilities:

- Equal Opportunity and Non-Discrimination Policy Statement
  `https://policies.ncsu.edu/policy/pol-04-25-05`
  with additional references at `https://oied.ncsu.edu/equity/policies/`
- Code of Student Conduct `https://policies.ncsu.edu/policy/pol-11-35-01`
- Grades and Grade Point Average
  `https://policies.ncsu.edu/regulation/reg-02-50-03`
- Credit-Only Courses `https://policies.ncsu.edu/regulation/reg-02-20-15`
- Audits `https://policies.ncsu.edu/regulation/reg-02-20-04`