ENCMP100 Computer Programming for Engineers

3 Credits, 16 weeks, 3 hours lecture. 1.5 hours lab, 3.8 Engineering Units for U. Alberta

Course Description

This course is an introduction to MATLAB with applications to engineering problems. Topics to be covered include an introduction to algorithmic problem solving, design methodologies, MATLAB language structure and syntax. Weekly laboratories offer students the opportunity to translate concepts presented in lectures into interesting application programs.

Prerequisites and/or co-requisites

Instructor

Jean-Pierre De Villiers
S211B
(780) 791-4940
 Jean-Pierre.DeVilliers@keyano.ca

Office Hours

Monday	14:00-14:50
Tuesday	14:00-14:50
Wednesday	14:00-14:50
Thursday	09:00-09:50
Friday	13:00-13:50

Hours of Instruction

Tuesday	09:00-10:50 (Lab)
Wednesday	09:00-09:50
Thursday	10:00-10:50
Friday	14:00-14:50

Required Resources

Required Text: Programming for Engineers – An Introduction to MATLAB and Octave Programming, Jean-Pierre De Villiers; ePub/iBook format available through Keyano Bookstore 2016, 1st edition.
Optional Text: MATLAB: A Practical Introduction to Programming and Problem Solving**,** Stormy Attaway; Butterworth-Heinemann, 2013, 3rd edition.
Lecture/lab notebook
USB storage device

Course Outcomes

1.   Using MATLAB as a tool to solve engineering problems.
2.   Developing modular MATLAB programs using user-defined functions.
3.   Visualization of large sets of data using MATLAB plotting capabilities.

Evaluation

Quizzes	10%
Labs	20%
Midterm Exam	25%
Final Exam	45%
Total	100%

A grade of C- is required for progression or transfer.

Grading System

Descriptor	Alpha Grade	4.0 Scale	Percent	Rubric for Letter Grades
	A+	4.0	> 92.9	Work shows in-depth and critical analysis, well developed ideas, creativity, excellent writing, clarity and proper format.
Excellent	A	4.0	85 – 92.9	
	A-	3.7	80 – 84.9	
	B+	3.3	77 – 79.9	Work is generally of high quality, well developed, well written, has clarity, and uses proper format.
Good	B	3.0	74 – 76.9	
	B-	2.7	70 – 73.9	
	C+	2.3	67 – 69.9	Work has some developed ideas but needs more attention to clarity, style and formatting.
Satisfactory	C	2.0	64 – 66.9	
Progression	C-	1.7	60 – 63.9	
Poor	D+	1.3	55 – 59.9	Work is completed in a general way with minimal support, or is poorly written or did not use proper format.
Minimum Pass	D	1.0	50 – 54.9	
Failure	F	0.0	< 50	Responses fail to demonstrate appropriate understanding or are fundamentally incomplete.

Proposed Schedule of Topics

Wk	Chapter	Main Topics	Lab
1	1	**MATLAB Bootcamp** - arithmetic operations, vectors and matrices - scripting	Introduction to MATLAB user interface
2	1	**MATLAB Bootcamp** - Basic selection logic and looping constructs - Basic functions and programs	Selection of problems from Chapter 1
3	2	**User interaction** - dialogs and menus - file input	Selection of problems from Chapter 1
4	3	**Vectors and Matrices** - Arrays, array vs matrix arithmetic - Strings	Selection of problems from Chapter 2
5	4	**Graphics and Visualization** - Basic plots, parametric plots	Selection of problems from Chapter 3
6	4	**Graphics and Visualization** - Linear transformations and animations	Selection of problems from Chapter 4
7		Midterm Review; Midterm	
8	5	**Data Collections**: - tables, structures, cell arrays	Selection of problems from Chapter 4
9	6	**Functions** - enhancing quality of functions - optional arguments	Selection of problems from Chapter 5
10	6	**Functions** - recursion	Selection of problems from Chapter 6
11	7	**Logic**: - Boolean logic, logical arrays - if/switch	Selection of problems from Chapter 6
12	8	**Fundamentals of Programming** - formalizing the design process; algorithm for algorithms	Selection of problems from Chapter 7
13	9	**Advanced Programming Topics** - vectorization, recursion, code validation	Selection of problems from Chapter 8
14		**Synthesis Project** - lectures and lab devoted to project (topic TBD)	Synthesis project

Please Note:
Date and time allotted to each topic is subject to change. It is your responsibility as a student to contact the Office of the Registrar to complete the forms for Withdrawal or Change of Registration, and any other forms. Please refer to the list of important dates as noted in the Academic Schedule in the Keyano College Credit Calendar.

Performance Requirements

Engineers are problem solvers. If you want to succeed in engineering it is important you learn how to organize your thoughts, to analyze, set up, and solve problems and to experience the often frustrating trials that arise in doing so. The best way to learn and retain knowledge is by practicing; the more problems you attempt and complete, the more experienced and confident you will become. Engineering is a demanding profession: you must be able to clearly articulate solutions to complex problems in a timely manner. This course will encourage you to develop the work habits and skills necessary to submit clear and concise work on deadline. To reinforce this, keep in mind that sloppy work will not be graded in any component of this course, and late work will also not be accepted. Teamwork is pervasive in engineering, but this is an activity that takes place among competent peers. Teamwork is a privilege that comes with competence. It is not a way to get by when you lack the skills to do the work yourself. In this course, working in groups can be helpful and is not discouraged, but you must be careful not to use teamwork to coast through a lab or project; any work that you turn in must be your own (see rules on plagiarism below).

iLearn and Lecture Notes

You are responsible for keeping a complete record of classroom work (lecture notes, interactive problems, classroom exercises) in a proper notebook. Lecture notes are posted to iLearn at the end of each week and do not constitute a complete record of lecture materials.

Quizzes and Exams

There will be one midterm exam and a final exam in this course, as well as 4 brief quizzes at three-week intervals. The midterm exam takes place during the lab period in the seventh week. The midterm will cover all topics covered up to the date of the exam. The two-hour final exam will take place during the exam period at the end of the term. The final exam is a closed book test where you are expected to demonstrate mastery of the subject. You will be expected to solve a set of problems, some similar to work you have previously done, some more challenging. The labs are designed to help you prepare for this examination, so make sure you take full advantage of these exercises.

All examinations and quizzes will involve a mix of written and practical work; the written component of exams must be completed and submitted before progressing to the practical, computer-based component of the examination.

Labs: YOU MUST BRING YOUR TEXTBOOK TO ALL LAB PERIODS

Ninety minutes per week will be used for laboratory exercises. The labs are designed to help you develop your programming and problem-solving skills by having you work out solutions to textbook problems or related exercises under the guidance of your instructor. Assessment of this component will be based on the quality and clarity of the submitted solution (MATLAB script and program files). Lab exercises are due at the end of the lab period, unless otherwise indicated. You are expected to work on lab exercises by yourself, though you may discuss your work with your instructor or a classmate; collaborative solutions are not allowed unless explicitly stated by your instructor.

Mentoring

All engineering students will be assigned a mentor (a faculty member). Brief meetings between student and mentor will take place at regular intervals, usually weekly, to help students manage the demands of the engineering program. Typical topics discussed with a mentor include study strategies, guidance, monitoring academic progress, among others.

Student Attendance

Class attendance is useful for two reasons. First, class attendance maximizes a students' learning experience. Second, attending class is a good way to keep informed of matters relating to the administration of the course (e.g., the timing of assignments and exams). Ultimately, you are responsible for your own learning and performance in this course.

It is the responsibility of each student to be prepared for all classes. Students who miss classes are responsible for the material covered in those classes and for ensuring that they are prepared for the next class, including the completion of any assignments and / or notes that may be due.

Academic Misconduct

Students are considered to be responsible adults and should adhere to principles of intellectual integrity. Intellectual dishonesty may take many forms, such as:

- Plagiarism or the submission of another person's work as one's own
- The use of unauthorized aids in assignments or examinations (cheating)
- Collusion or the unauthorized collaboration with others in preparing work
- The deliberate misrepresentation of qualifications
- The willful distortion of results or data
- Substitution in an examination by another person
- Handing in the same unchanged work as submitted for another assignment
- Breach of confidentiality.

The consequences for academic misconduct range from a verbal reprimand to expulsion from the College. More specific descriptions and details are found in the Student Rights and Student Code of Conduct section of the Keyano College 2015-2016 credit calendar. It is the responsibility of each student to be aware of the guidelines outlined in the Student Rights and Student Code of Conduct Policies.

In order to ensure your understanding of the concept of plagiarism, you must successfully complete the online tutorial found on the iLearn home page. Then print the certificate, sign it, and show it to each of your instructors. Your course work will not be graded until you show this signed certificate.

Specialized Supports

Counselling and Disability Services

Counselling Services provides a wide range of specialized counselling services to prospective and registered students, including personal, career and academic counselling.

SKILL Centre

The SKILL Centre is a learning space in the Clearwater Campus at Keyano College where students can gather to share ideas, collaborate on projects and get new perspectives on learning from our tutorial staff.

The SKILL Centre, through a variety of delivery methods, provides assistance in skill development to Keyano students. Assistance is provided by instructors, staff and student tutors. Individuals wishing to improve their mathematics, writing, grammar, study, or other skills, can take advantage of this unique service.

Authorization

This course outline has been reviewed and approved by the Program Chair.

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Jean-Pierre De Villiers, Instructor

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Louis Dingley, Chair   Date Authorized

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Guy Harmer, Dean   Date Authorized

Signed copies to be delivered to:
Instructor
Registrar's Office