Three Rivers
COMMUNITY COLLEGE

Course Description:
(*MEC K231*) This course introduces the use of computers to conduct engineering analysis, a systematic process of analyzing and understanding problems that arise in the various fields of engineering. Students will carry out engineering numeric computations using Microsoft EXCEL™ and the MATLAB™ and Graphing, data acquisition & analysis, fitting equations to data and solving equations will be covered. The class will be conducted in a "learning laboratory" style in which students exercise a self paced individual learning experience through the completion of weekly assignments and quizzes.

(*MEC 232*) In this lab, students will apply the fundamentals of engineering analysis using Microsoft EXCEL™ and the MATLAB™ software in an IBM-PC environment. Topics given in the lecture will be learned and reinforced through solving application problems on the computer.

Lecture and Lab Outcomes:
- Students will demonstrate the ability to use appropriate mathematical and computational skills needed for engineering technology applications.
- Students will illustrate an ability to think critically and identify, evaluate and solve complex technical and non-technical problems; demonstrate creativity in designing problem solutions; and conduct and interpret experimental data and outcomes.
- Students will recognize the need to be lifelong learners.

Lecture & Lab Performance Criteria:
The above outcomes will be assessed using these performance criteria:
- Mathematical and computational skills-
  - ✓ Ascertain problem conditions by identifying known and unknown quantities in formulating a problem for solution
  - ✓ Demonstrates the correct selection and application of pertinent formulae, principles and concepts.
  - ✓ Pursue solutions in a methodical, logical manner with results correctly explained with sufficient detail and properly documented
  - ✓ Submit problem solutions with a minimum of computational errors, identifying and selecting the correct dimensional units
- Critical thinking-
  - ✓ Show the ability to evaluate the credibility of sources of information
  - ✓ Demonstrate the ability to refine generalizations, establish rational & pertinent assumptions, and avoid oversimplifications
  - ✓ Exhibit the ability to generate, analyze / evaluate, and assess multiple engineering problem solution options
  - ✓ Produce documentation that reflects organization and application of engineering principles in specifying solution to an engineering problem
- Lifelong learning-
  - ✓ Demonstrate an awareness of what needs to be learned; formulate questions based on research need
  - ✓ Develop a research plan appropriate to the investigative method
  - ✓ Identify, retrieve and organize information
  - ✓ Use a variety of methods and emerging technologies to keep current in the field

Instructor:
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Text Book:
1. *Engineering Computations: An Introduction Using MATLAB and EXCEL* (isbn 978-07-338016-2). Musto
2. *References available on Mathworks website for project*
   a. http://www.mathworks.com/products/simulink/
   b. http://www.mathworks.com/hardware-support/arduino-matlab.html?s_tid=srchtitle
   c. https://www.mathworks.com/hardware-support/lego-mindstorms-ev3-matlab.html
   d. http://www.mathworks.com/hardware-support/lego-mindstorms-ev3-simulink.html?s_tid=srchtitle
   e. Matlab support page
      http://www.mathworks.com/help/matlab/getting-started-with-matlab.html?s_cid=learn_doc
   f. Mathworks hardware support page:
      http://www.mathworks.com/hardware-support/home.html
   g. See Blackboard for other articles and links to useful references.
   h. Excel support page:
      https://support.office.com/en-us/article/Excel-2013-videos-and-tutorials-aaae974d-3f47-41d9-895e-97a71c2e8a4a

Procedure:
The course will consist of a lecture followed by a lab. Both the lecture and lab will consist of open discussion, which the student is encouraged to ask questions and relate their own experiences. The discussions will be conducted around the reading assignments and the homework/laboratory problems.

Instructor Assistance:
Seeking help from the instructor outside of class is encouraged if you are having difficulty understanding course material. Feel free to Email/call for an appointment during office hours.

Academic Integrity:
Academic integrity is essential to a useful education. Failure to act with academic integrity severely limits a person's ability to success in the classroom and beyond. Furthermore, academic dishonesty erodes the legitimacy of every degree awarded by the College. In this class and in the course of your academic career, present only your own best work; clearly document the sources of the material you use from others; and act at all times with honor.

Attendance:
This course is designed in such a way that a student should get more from the in-class activities than from the textbook alone. Therefore, students who are registered for this course are naturally expected to attend class regularly. Over the span of a semester the instructor expects to become familiar with the attendance habits of individual students. Therefore, these habits cannot help but be a factor in the evaluation of class participation and student contribution.

Grading Policy:

Several exams will be given during the semester. The dates of the exams are noted in the Lecture Schedule. Final grades will be based on a normal distribution of all students taking the course based on the following weighting:

Homework	25%
Quiz/Exam Average	25%
Participation	10%
Project Average	40%

Homework is due the class period after being assigned. Homework may be turned in no more than two weeks after the assignment date for a maximum credit of 60%.

The multi-part projects will be handed out during the semester with salient details included in the handout. Also toward the latter third of the class a separate project on using a computer language to do something will be required. This can be an individual or group project.

Withdrawal:

A student who finds it necessary to discontinue a course must complete a "Withdrawal Request Form" available in the Registrar's office within the time limits of the semester calendar. Students who do not withdraw, but stop attending will be assigned an "F" signifying a failing grade. The last day to withdraw from classes is on the academic calendar.

Disabilities Statement:

If you have a question regarding a disability that may affect your progress in this course, please contact one of the college's Disability Service Providers as soon as possible. Chris Scarborough (860/215-5751) generally works with students who have learning disabilities or attention deficit disorder. Kathleen Gray (860/210-9248) generally works with students who have physical, visual, hearing, /medical, mobility, and psychiatric disabilities. Matt Liscum (860/215-9265) also works with students who have disabilities.

If you will need accommodations for this class, you must contact the Disabilities Counseling Services. To avoid any delay in the receipt of accommodations, you should contact the counselor as soon as possible. *The instructor cannot provide accommodations until an accommodation letter from the Disabilities Counselor is received.*

Digication:

All students are required to maintain an online learning portfolio in Digication that uses the college template. Through this electronic tool students will have the opportunity to monitor their own growth in college-wide learning. The student will keep his/her learning portfolio and may continue to use the Digication account after graduation. A Three Rivers General Education Assessment Team will select and review random works to improve the college experience for all. Student work reviewed for assessment purposes will not include names and all student work will remain private and anonymous for college improvement purposes. Students will have the ability to integrate learning from the classroom, college, and life in general, which will provide additional learning opportunities. If desired, students will have the option to create multiple portfolios.

Date		Topic	Reading Note 1	Assignment	Due date
Week 1	Aug 27,29	Chap 1: Computing Tools Chap 2: EXCEL Fundamentals	Pg 3-54	1.2; 1.6; 2.3	9/4
Week 2	Sept 2,4	Chap 2: EXCEL Fundamentals Intro to matlab	Pg 21-54	2.12; 2.16; 2.19	9/11
Week 3	Sept 9,11	Chap 3: MATLAB Fundamentals	Pg 63-98	3.4; 3.11; 3.13; 3.16; 3.20	9/26
Week 4	Sept 16,18	Chap 4: MATLAB Programming	Pg 105-142	3.22; 3.23; 4.6; 4.8; 4.10	9/26
Week 5	Sept 24,26	Chap 5 Plotting Data	Pg 143-196	5.1; 5.4; 5.5; 5.14; 5.18	10/3
Week 6	Oct 1,3	**EXAM: MATLAB/EXCEL Chap 1-5** Oct 8	Pg 197-220	6.3; 6.12; 6.15	
Week 7	Oct 8,10	Chap 6: Finding Roots of an Equation			10/17
Week 8	Oct 15,17	Chap 7 Matrix Mathematics	Pg 221-238	7.2; 7.3; 7.4; 7.5; 7.6	10/24
Week 9	Oct 22,24	Chap 8: Solving Simultaneous Equations	Pg 239-258	8.1a; 8.2a; 8.4; 8.10; 8.12	10/31
Week 10	Oct 29, 31	Chap 8,9			11/7
Week 11	Nov 5,7	Chap 9: Numerical Integration	Pg 259-286	9.2a; 9.2b; 9.3c; 9.7	11/14
Week 12	Nov 12,14	Chap 10: Optimization	Pg 287-325	10.9; 10.10 Optimization project Due	11/21
Week 13	Nov 19,21	**EXAM: Matrices Roots Nov 26Simultaneous Equations Integration** Chap 6-10 Project Ideas due			
Weeks 14,15		Project work. 1. Using Matlab, Simulink Labview, JAVA develop and program a controller to read data perform calculations and control an output function. Equipment available at TRCC, LEGO NXT, EV3, Arduino, Raspberry PI, Jetson, Machine Vision cameras (Labview ,Sony, Webcams). Others may be available see instructor. See separate handout for details.			12/12

Note 1: See Blackboard or J Drive for chapter power point presentations, referenced handouts assignment tips.