ENGR 2304-101C3
Programming for Engineers
Fall 2025
Monday, Tuesday 11:00 am – 1:50 pm
16 Weeks

Instructor Information: Dr. E. Carl McIntyre, emcintyre1@com.edu, (337)693-2624

Student hours and location: 9:00 am – 11:00 am Monday, Wednesday STEAM 325-28
Tuesday Thursday 11:30 am to 2:00 pm Virtual Zoom. Friday 10:00 am to 12:30 pm via Zoom
Required Textbook/Materials:
Textbook: None (Readings and Handouts Will Be Provided)
Materials: Notebooks, Cell Phones with online access, Calculators
Online Resources: COM Brightspace

Course Description:
Programming principles and techniques for matrix and array operations, equation solving, and numeric simulations applied to engineering problems and visualization of engineering information; platforms include spreadsheets, symbolic algebra packages, engineering analysis software, and laboratory control software.

Prerequisite: MATH 1314 with a grade of "C" or better

Course requirements:
Homework Assignments
- Homework has deadlines and must be completed on time for full credit.
- Homework is completed outside of class as part of the hybrid online course

In Class Programs
- In Class programs are done in class with the help of the instructor for the purpose to help you learn programming through hands on participation.

Excel Programs
- You will design excel programs as a beginner to help you with using the computation in spreadsheets as an engineering tool.

Projects and Mini-Projects
- There will be design projects including a full formal project report.

Determination of Course Grade/Detailed Grading Formula:

Grade Item	% of Final Grade	Pts
In Class Programs	25%	15 Programs (20 pts Each) 300 pts
Projects	50%	3 Projects (200 pts Each) 600 pts
Homework Programs	15%	9 Programs (20 pts Each) 180 pts
Quiz/Class Work	10%	Top 12 Works (10 pts Each) 120 pts
Attendance Discount	-10%	Unexcused Absences/Tardiness

Percentage	Letter Grade
90-100	A
80-89	B
70-79	C
60-69	D
0-59	F

Late Work, Make-Up, and Extra-Credit Policy:
Late Work: Because this is a directed study please be sure to simply contact the instructor for any late work. This course is designed to accommodate some of life's mishaps, difficulties, or tragedies by providing extended deadlines for various assignments. After the initial due date, there may be an extended deadline to submit your assessment or assignment. After the extended deadline, the assignment or assessment is closed to submission and no additional time will likely be provided.

Attendance Policy: Because this is a directed study you are expected to attend all class meetings. Otherwise, contact the instructor if you are unable to make a class session.

Communicating with your instructor: ALL electronic communication with the instructor must be through your COM email. Due to FERPA restrictions, faculty cannot share any information about performance in the class through other electronic means.

Student Learner Outcomes for this Course
Upon successful completion of this course, students will successfully demonstrate mastery of the Student Learner Outcomes listed below.

1. Use matrix and array operations for equation solving.
2. Identify the strengths and weaknesses of the conventional programming languages.
3. Use spreadsheets and their built in features to solve a variety of engineering problems.
4. Describe methods for the design of programs that control equipment or analyze data.
5. Write computer programs to solve engineering problems and perform engineering simulations.
6. Graphically present engineering data, results, and conclusions.

FOR STUDENTS ONLY
Student Learning Outcomes (SLOs) like those listed above for this course are clear, concise statements that outline what students should know, understand, or be able to do at the end of a learning experience. They are designed to be measurable and observable. They also focus on the outcomes, not the processes or activities used to achieve them.

Core Objectives for College of the Mainland Used Within This Course

1. Critical Thinking Skills: Critical thinking skills include creative thinking, innovation, inquiry as well as analysis, evaluation and synthesis of information. For engineers critical thinking is always included as a part of problem solving. (Check out the book Strategies for Creative Problem Solving. An Engineering book by Dr. Fogler a chemical engineering professor)
2. Empirical and Quantitative Skills: Empirical and Quantitative skills include the ability to manipulate and analyze numerical data or observable facts resulting in informed conclusions. As an engineer you learn to go beyond math and collecting data. You develop the skills to analyze lots of data and use the information that the data provides you with to transform how things are made and built in the real world.
3. Communication Skills: Communication skills include effective development, interpretation, and expression of ideas through written, oral and visual communication. As an engineer your ability to communicate will determine how far you are able to get in your career. While some call these "soft skills" those who master the students who master these are the ones that companies are always looking to hire. As a professional engineer you will spend half of your time communicating either in written reports or orally. (See Engineering Communication a textbook for professional workplace communication)
4. Teamwork: Teamwork includes the ability to consider different points of view and to work effectively with others to support a shared purpose or goal. Engineers almost always work in teams so learning to team is essential to success in the workforce. Finally on teaming assignments remember that "failure to team is…failure."
5. Social Responsibility: Social responsibility includes intercultural competence, knowledge of civic responsibility, and the ability to engage effectively in regional, national and global communities. Upon graduation you will be given the opportunity to become a member of the "Order of the Engineer". You will make a pledge to practice integrity, serve humanity

and give knowledge for the public good. As a professional engineer you must be aware and be able to exercise not just analysis for what works but also what is good for society.

6. Personal Responsibility: Personal responsibility includes the ability to connect choices, actions and consequences to ethical decision making. As an engineer you have to own your mistakes. Every choice you make has consequences and understanding how your choices results in those consequences is a part of being an engineer.

FOR STUDENTS ONLY

The six core objectives are expected of any student who completes the core curriculum here at the College of the Mainland. These objectives given above were developed by the Texas Core Curriculum.

Mapping Student Learner Outcomes to Core Objectives and Assessing them.

Student Learner Outcome	Maps to Core Objective	Assessed via this Assignment
1. Use matrix and array operations for equation solving.	Empirical and Quantitative Skills (*Analyze Numerical Data*)	Homework Programs
2. Identify the strengths and weaknesses of the conventional programming languages.	Critical Thinking Skills *(Evaluation of Tools and Information)*	Projects
3. Use spreadsheets and their built in features to solve a variety of engineering problems.	Empirical and Quantitative Skills *(Engineering Analysis to Reach Informed Conclusions)*	In Class Programs
4. Describe methods for the design of programs that control equipment or analyze data.	Communication Skills *(Expression of ideas through written communication)*	Projects
5. Write computer programs to solve engineering problems and perform engineering simulations.	Critical Thinking Skills *(creative thinking, innovation, inquiry as well as analysis to build a program)*	Mini-Projects
6. Graphically present engineering data, results and conclusions.	Communication (Visual Communication of Data and trends)	Excel Programs

Academic Dishonesty:

- College of the Mainland is committed to a high standard of academic integrity. In becoming a part of the academic community, students are responsible for honesty and independent effort. Incidents of academic and scholastic dishonesty (including cheating, plagiarism, and collusion) will be dealt with in a manner consistent with College Policy and the Student Handbook.
- Violations may result in a penalty. The maximum penalty will be a grade of "F" for the course. Violations may also be reported to the Judicial Coordinator as instances of Inappropriate Behavior. Please see the section on Privileges and Obligations in the Student Handbook for a more complete discussion of Inappropriate Behavior, and of your rights and responsibilities.
- There are many situations where you will be required to submit written work to earn points. It is important that the work you submit be your own. You cannot copy the work of another, or have your work copied by another. Doing so will be considered a violation of Academic Honesty.
- The work that you submit must be a product of your own mind. When completing assignments, for example, you are encouraged to collaborate with others to try to come to an understanding. But when you set pen to paper to write your answer, what you write must be a product of your own mind. When identical, or nearly identical, writings are submitted by students, it will lead me to suspect that work was copied. You could then be in violation of the standards of academic honesty, as described above.

Student Concerns: If you have any questions or concerns about any aspect of this course, please contact me using the contact information previously provided. If, after discussing your concern with me, you continue to have questions, please contact Sheena Abernathy at sabernathy@com.edu.

Course outline: (include calendar with lecture topics, due dates)

Semester Topics For Programming for Engineers

Week 1A Write Your First VBA Code and Create Your First Userform

Week 1B VBA Variables and Datatypes: Variables in Computer Programming

Week 2A VBA If Then Statements and Flowcharting

Week 2B Introduction to Algorithms and Pseudocode in VBA

Week 2C Learning to Comment on Code in VBA

Week 3A Looping in VBA

Week 3B Message Boxes and Input Boxes in VBA

Week 4A Data Arrays in VBA

Week 4B VBA Controls with Data Arrays: Combo Boxes, Radio Buttons, Menus

Week 4C Introduction to Object Oriented Programming In Excel VBA

Week 4D Introduction to Event Driven Programming in Excel VBA

Week 5A Excel VBA Subroutines and Functions

Week 5B Excel VBA Learning Modular Programming With Examples (VBA Modules)

Week 5C Excel VBA Working With Multiple Userforms in Excel VBA

Week 6A Combining VBA with Excel Worksheets for Vector and Matrix Operations

Week 6B Excel VBA For Root Finding Algorithms (Bisection, Newton-Raphson)

Week 6C Excel VBA for Linear Regression and Curve Fitting

Week 7A Using Excel VBA to Read and Write CSV and Text Files

Week 7B VBA Automation: Writing Engineering Reports in Microsoft Word using Excel VBA

Week 7C How to Write An Input Data Sheet for Your Engineering Program with Help From AI

Week 7D How to Write A Technical User Manual For Your Engineering Program With Help From AI

Week 7E: How to Write a User Manual For Your Engineering Program With AI

Week 8A Protecting Your Workbook and Code with Workbook Protection, VBA Project Protection, Hiding Worksheets

Week 8B Best Practices For VBA Distribution: Help Files, Installation Instructions, Digital Signatures, and Consideration For Networked Environment

Module 1 (3 Weeks) Learning Chemical Simulation with DWSim and combining it with Excel VBA

Module 2 (3 Weeks) Comparing Engineering Applications for Computation and Automation: Maple vs Matlab vs MS Excel

TOPICS LISTING

1. Variables
- Declaring, Defining, Variables
2. Looping in Programing (If Then, For Next, Do While)
3. Datatypes in Programming
- Numeric (Long, Double, Short)
- NonNumeric (Strings)
4. UserForm Design in Visual Basic for Applications with Excel
- Textboxes, Label Boxes, Command Buttons (Code)
5. Algorithm Design for Problems in Engineering
- Pseudocode, Flowcharts
- Using Modular Program Design
6. Input Boxes and Message Boxes
- Types of Message Boxes: Ok/Cancel, Yes/No, etc.
- Inputing variables with Input Boxes
7. Using Data Arrays
- Creating a List to Store Multiple Variables
- Creating a 2D Array Matrix for Data
- Creating a 3D Array for Advanced Calculations
- Using Control Arrays in Forms in Visual Basic
8. Using Subroutines and Procedures in Programming
- Functions, Modules and Procedures
9. Arrays in Combo Boxes and Other Controls
- Designing Combo Boxes
- Adding a List to A Combo Box
- Using an array to Create Menu Items
10. Working with Graphics in Visual Basic Programs
Designing equation to be visually displayed in programs
11. Designing Programs with Multiple Windows and Multiple Forms
Switching between Forms
Using Multiple Forms to Guide the User through Multiple Processes
12. Numerical Method that can be utilized in Engineering
- Newton Raphson Method
- Bisection Method
- Graphical Integration (Rectangular Rule)

Class	Wk	Day/Date	Topics
1	1	Monday 08/18/25	Introduction to Class Introduction to MS Excel Introduction to MS Excel VBA Introduction to Matlab
2	1	Wednesday 08/20/25	Controls Variables Datatypes Userforms
3	2	Monday 08/25/25	Looping in Programing (If-Then, For Next, Do While)
4	2	Wednesday 08/27/25	Algorithm Design for Problems in Engineering (Pseudocode, Flowcharts, Using Modular Program Design)
	3	Monday 09/01/25	LABOR DAY
5	3	Wednesday 09/03/25	Input Boxes and Message Boxes (Types of Message Boxes: Ok/Cancel, Yes/No, etc.) (Inputing variables with Input Boxes)
6	4	09/08/25	Using Data Arrays (Creating a List to Store Multiple Variables) (Creating a 2D Array Matrix for Data) (Creating a 3D Array for Advanced Calculations) (Using Control Arrays in Forms in Visual Basic)
7	4	09/10/25	Arrays in Combo Boxes and Other Controls Designing Combo Boxes Adding a List to A Combo Box Using an array to Create Menu Items
8	5	09/15/25	Using Subroutines and Procedures in Programming (Functions, Modules and Procedures)
9	5	09/17/25	Designing Programs with Multiple Windows and Multiple Forms Switching between Forms Using Multiple Forms to Guide the User through Multiple Processes
10	6	09/22/25	Defining and Solving Systems of Linear Equations in MS Excel and Matlab
11	6	09/24/25	Defining and Solving Roots of Polynomial Equations Graphically
12	7	09/29/25	Numerical Differentiation in Engineering Problems #1
13	7	10/01/25	Numerical Differentiation in Engineering Problems #2
14	8	10/06/25	COM CLOSED THANKSGIVING
15	8	10/08/25	Numerical Integration in Engineering Problems #1

16	9	10/13/25	Numerical Integration in Engineering Problems #2
17	9	10/15/25	Final Project
18	10	10/20/25	Final Project
19	10	10/22/25	Final Presentation/Final Project Due
20	11	10/27/25	DWSIM Introduction to Simulation
21	11	10/29/25	DWSIM Introduction to Simulation
22	12	11/03/25	DWSIM Introduction to Simulation
23	12	11/05/25	DWSIM Introduction to Simulation
24	13	11/10/25	DWSIM Introduction to Simulation
25	13	11/12/25	DWSIM Introduction to Simulation
26	14	11/17/25	Introduction to Matlab Methods
27	14	11/19/25	Introduction to Matlab Methods
28	15	11/24/25	Introduction to Maple
29	15	11/26/25	Introduction to Maple
30	16	12/01/25	Optional Day
31	16	12/03/25	Optional Day

Institutional Policies and Guidelines

Grade Appeal Process: Concerns about the accuracy of grades should first be discussed with the instructor. A request for a change of grade is a formal request and must be made within six months of the grade assignment. Directions for filing an appeal can be found in the student handbook **https://www.com.edu/student-services/docs/Student_Handbook_2024-2025_v2.pdf.** *An appeal will not be considered because of general dissatisfaction with a grade, penalty, or outcome of a course. Disagreement with the instructor's professional judgment of the quality of the student's work and performance is also not an admissible basis for a grade appeal.*

Academic Success & Support Services: College of the Mainland is committed to providing students the necessary support and tools for success in their college careers. Support is offered through our Tutoring Services, Library, Counseling, and through Student Services. Please discuss any concerns with your faculty or an advisor.

ADA Statement: Any student with a documented disability needing academic accommodations is requested to contact:
Kimberly Lachney, Student Accessibility Services Coordinator
Phone: 409-933-8919
Email: AccessibilityServices@com.edu
Location: COM Doyle Family Administration Building, Student Success Center

Textbook Purchasing Statement: A student attending College of the Mainland is not under any obligation to purchase a textbook from the college-affiliated bookstore. The same textbook may also be available from an independent retailer, including an online retailer.

Withdrawal Policy: Students may withdraw from this course for any reason prior to the last eligible day for a "W" grade. Before withdrawing students should speak with the instructor and consult an advisor. Students are permitted to withdraw only six times during their college career by state law. The last date to withdraw from the 1st 8-week session is October 1. The last date to withdraw from the 16-week session is November 14. The last date to withdraw for the 2nd 8-week session is November 25.

FN Grading: The FN grade is issued in cases of *failure due to a lack of attendance*, as determined by the instructor. The FN grade may be issued for cases in which the student ceases or fails to attend class, submit assignments, or participate in required capacities, and for which the student has failed to withdraw. The issuing of the FN grade is at the discretion of the instructor. The last date of attendance should be documented for submission of an FN grade.

Early Alert Program: The Student Success Center at College of the Mainland has implemented an Early Alert Program because student success and retention are very important to us. I have been

asked to refer students to the program throughout the semester if they are having difficulty completing assignments or have poor attendance. If you are referred to the Early Alert Program you will be contacted by someone in the Student Success Center who will schedule a meeting with you to see what assistance they can offer in order for you to meet your academic goals.

Resources to Help with Stress:
If you are experiencing stress or anxiety about your daily living needs including food, housing or just feel you could benefit from free resources to help you through a difficult time, please click here https://www.com.edu/community-resource-center/. College of the Mainland has partnered with free community resources to help you stay on track with your schoolwork, by addressing life issues that get in the way of doing your best in school. All services are private and confidential. You may also contact the Dean of Students office at deanofstudents@com.edu or communityresources@com.edu.

Nondiscrimination Statement:
The College District prohibits discrimination, including harassment, against any individual on the basis of race, color, religion, national origin, age, veteran status, disability, sex, sexual orientation, gender (including gender identity and gender expression), or any other basis prohibited by law. Retaliation against anyone involved in the complaint process is a violation of College District policy.