OAKLAND UNIVERSITY
SCHOOL OF ENGINEERING AND COMPUTER SCIENCE
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COMPUTER PROBLEM SOLVING IN ENGINEERING AND COMPUTER SCIENCE

WINTER 2018

EGR 1400 (4 Credits); In-Person Class: 10550

INSTRUCTOR: Mohammad-Reza Siadat, PhD, (siadat@oakland.edu), EC 540

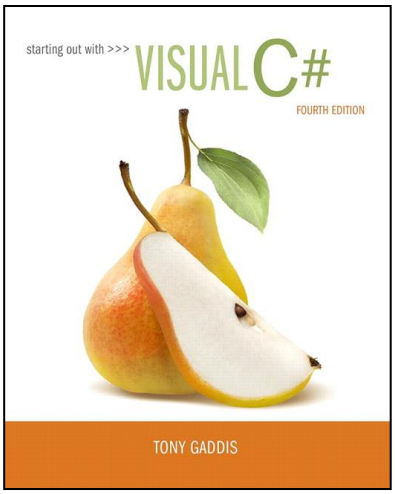
COREQUISITES: MTH 154 (Calculus I) or equivalent, elementary knowledge of Linear Algebra

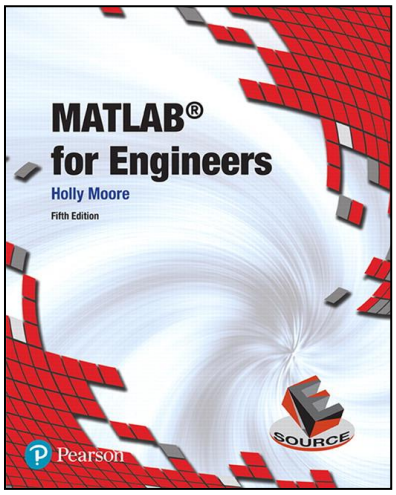
LECTURES: Mondays and Wednesdays, 3:30-5:17 PM, EC 116 (Engineering Center)

TEXTBOOKS

C# (Required): Tony Gaddis, *Starting out with Visual C#*, 4th Edition, Pearson Publishing 2017, ISBN13: 9780134382609

MATLAB (Recommended): Holly Moore, *MATLAB for Engineers*, 5th Edition, Pearson Publishing 2018, ISBN13: 9780134589640





COURSE DESCRIPTION: General introduction to problem solving and principals of algorithmic design using high level languages such as C# and MATLAB.

COURSE CONTENTS:

C# .NET

- Introductory Programming Concepts, Algorithm Design, and C# .NET Environment
- Fundamentals of Event-Driven Programming
- Data Types, Variables, and Assignment Statements
- Arithmetic Operators and Scope
- Decisions and Data Validation
- Simplifying Programming through Modularity
- Error Handling
- Repetitive Structures/Loops
- Arrays
- Sequential Files
- Introductory Database Programming with Data Objects

MATLAB

- An introduction to using Matlab for solving problems in Engineering
- Using matrices in Matlab, debugging in Matlab, and using and creating functions in Matlab

PROBLEM SOLVING (TENTATIVE)

- Uncertainty and Design
- Divide and Conquer Techniques in Electronics and Dynamics
- Estimating and Predicting Unknowns
- Simulation
- Noise and Filtering

HOMEPAGE: https://moodle.oakland.edu/moodle/

ABET AND ENGINEERING EDUCATION:

Engineering programs in the United States are accredited by the Accreditation Board for Engineering and Technology (ABET). All engineering students in such accredited programs (including all engineering majors at Oakland University) must demonstrate, before graduation, that they have achieved the following program outcomes:

a. an ability to apply knowledge of mathematics, science, and engineering
b. an ability to design and conduct experiments, as well as to analyze and interpret data
c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d. an ability to function on multi-disciplinary teams
e. an ability to identify, formulate, and solve engineering problems
f. an understanding of professional and ethical responsibility
g. an ability to communicate effectively
h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i. a recognition of the need for, and an ability to engage in life-long learning
j. a knowledge of contemporary issues
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

EGR 1400 is part of the engineering core, a set of courses taken by all engineering students. The course is an introduction to computer problem solving in engineering. If you are an electrical or computer engineering major this course will give you a solid foundation and background for future courses in your major. If you are a mechanical engineering or industrial engineering major this course will give you basic knowledge of solving problems, developing an algorithm or method to solve a problem, and programming a computer to carry out the method that you created. Almost all products today have small or significant computer programs.

Note that the above ABET program outcomes (a – k) apply to all engineering programs – electrical, mechanical, industrial, systems, or computer engineering. This course will contribute to these program outcomes through the following course objectives.

COURSE OBJECTIVES:

A student who is successful in EGR 1400 will be able to:

- Solve problems in Engineering and Computer Science (a, b, d, e, h, k)
- Design an algorithm and use Visual Basic .NET to develop a program (a, b, c, e, k)
- Use events in the design and implementation of graphical user interfaces (a, b, c, e, k)
- Use forms, buttons, textboxes, radio buttons, and listboxes in Visual Basic (a, b, c, e, k)
- Develop Visual Basic code for functions, loops, and decision structures (if and case) (a, b, c, e, k)
- Use the Visual Basic debugger to watch variables and program execution (a, b, c, e, k)
- Use memory and storage properly including variables, arrays, sequential files and a database using Visual Basic .NET (a, b, c, e, k)
- Use Matlab Toolbox functions to solve problems (a, b, c, e, k)

COURSE PROCEDURES: Two lectures, one lab and one problem solving sessions per week; Two midterms and one final exam; No makeup exams are given unless the emergency is documented properly.

PROBLEM-SOLVING EXERCISES

Problem Solving Exercises will be posted on Moodle. The exercises should be by the due date given for the exercise. Late exercises are not accepted. Your problem-solving exercises must be done with one or two other people (a total of two or three people). If a problem-solving exercise is turned in individually (only one person), 20 points will be deducted. Problem-solving will begin **(TBD)**.

LABORATORY

The laboratory will be held each week starting on **(TBD)**. Laboratory experiments will be conducted individually unless otherwise specified.

The lab must be completed and demonstrated to the lab mentor. The lab mentor will sign the signature page after you have successfully demonstrated your solution. Each lab assignment will specify a set of deliverables, these are the items that you will hand in for credit. The signature page and any other deliverables must be handed in to the lab mentor at the beginning of the next lab period to receive full credit unless other arrangements have been made with your lab mentor prior to the due date. The experiments that will be done this term will be given on Moodle. Specific laboratory procedures will be given in the lab. There will be approximately ten lab assignments in this course.

When demonstrating your solution, the lab mentor will ask you questions about your solution. Up to sixty percent of your grade will be based on whether or not your mentor is confident that you understand your solution.

LABS and PROBLEM SOLVING: First 50 minutes problem solving and the rest lab

GRADING:

- 15% Problem-Solving Exercises (about 5 assignments)
- 25% Laboratory Experiments (about 10 assignments)
- 20% Midterm Exam #1
- 20% Midterm Exam #2
- 20% Final Exam

IMPORTANT DATES:

Final exam: Wednesday April 25 from 3:30 to 6:30 PM in EC 116 (Engineering Center)

For more important dates of Winter 2018 see:
https://oakland.edu/registrar/important-dates/

ACADEMIC CONDUCT:

Problem-Solving Homework: You will be working in groups to complete the problem-solving homework. **You may not consult other groups for solutions.**

Lab Assignments: You may consult with your lab instructor or other students for assistance, however, **you may not copy code, portions of code, or have them write code for you.** You will be expected to be able to answer the questions asked by the laboratory instructor regarding how you designed your program. Your lab solution **must be your own work**.

Exams: During an exam, **you must bring picture identification**. Exams are independent assignments that will be completed in class without the consultation of any students or materials. Copying from another student or talking during an exam is prohibited.

The "**Academic Conduct Policy**" is explained in the Undergraduate catalog. Students suspected of cheating will be referred to the Academic Conduct Committee according to the “Academic Conduct Policy”. Any student found responsible for cheating by that committee will receive a 0.0 in the course.