The University of Texas at Tyler
Department of Electrical Engineering

EENG 3308.060: Programming Languages for Design

Syllabus

Catalog Description:

EENG 3308: Programming Languages for Design
A hands-on course designed to teach students programming languages and tools for design projects. Introduction to high-level programming languages and modern engineering tools for systems modeling, analysis and design: Matlab; Python; NI Labview; basic project implementation using a microcontroller development environment. Three hours of lecture per week.

Prerequisites: N/A

Credits: 3   (3 hours lecture,   0 hours laboratory per week)

Text(s):   No Textbook

Required Material :

Text: Documentation and reference materials provided by the Instructor.
Software: MATLAB 2013 or later, Python 3 compiler, NI LabVIEW, Arduino IDE.
Hardware: A list of sensors, microcontrollers, and components to build a small robotic and IoT project must be purchased for the group project. Here is an example: Pi Pico processor :
https://www.adafruit.com/product/5525?gclid=CjwKCAiA8OmdBhAgEiwAShr404BoHJr DsLTRdsUTisfi0CYPn4qMKRcPCZS15R3mS6cCkKnF9AsSBxoC1xAQAvD_BwE
Robotic car kit:
https://www.amazon.com/VKmaker-Avoidance-tracking-Ultrasonic-tutorial/dp/B01CXVA6IO

Course Coordinator: Dr. Prabha Sundaravadivel, Assistant Professor

Topics Covered: (paragraph of topics separated by semicolons)

MATLAB: Variables and functions, Basic Arithmetic Operations, Conditional statements, loops, Data Imports and Analysis; **Python 3:** Object and Data Structure Basics, Comparison Operators and Statements, Methods and Functions, Introduction to Micro Python using Pi PiCO processor; **LabView:** Types of data, structures & Loops, Array, Numeric, String, Timing Project, File & Report; **Arduino:** Programming Basics, User Input, Feedback, Sensors, Robotics, The Internet of Things (IoT).

Evaluation Methods: (only items in dark print apply):

1. Examinations/ Quizzes
2. Homework
3. Report
4. Computer Programming
5. Project
6. Presentation
7. Course Participation
8. Peer Review

Course Learning Outcomes[1]: By the end of this course students will be able to:

1. Use MATLAB functions to perform mathematical operations and plotting with scalars, complex numbers, matrices and vectors. [1,4]
2. Implement algorithms such as solving sets of simultaneous equations and numerical methods using basic structured programs in MATLAB. [1,4]
3. Import and Export data using MATLAB programming. [4,5]
4. Understand Python object-oriented and functional programming styles in a development environment [1]
5. Apply key Python data structures and algorithms effectively for scientific computing [1,4]
6. Analyze the user input and feedback system in Arduino programming. [1]
7. Implement basic project in the Arduino microcontroller integrated development environment. [5]

8. Analyze the significance of the given programming languages in current market. [3,6]
9. Explore the applications of Arduino in IoT and robotics. [5]

[1]Numbers in brackets refer to method(s) used to evaluate the course learning outcome.

Relationship to Student Outcomes (only items in dark print apply)[2]: This course supports the following Electrical Engineering Student Outcomes, which state that our students will possess:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics [1,2]
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors [4, 6].
3. an ability to communicate effectively with a range of audiences [8]
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts [9]
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives [5]
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions [3]
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies. [7]

[2]Numbers in brackets refer to course learning outcome(s) that address the Program Outcome.

Contribution to Meeting Professional Component: (in semester hours)

Mathematics and Basic Sciences:		hours
Engineering Sciences and Design:	3	hours
General Education Component:		hours

Grade Replacement:

If you are repeating this course for a grade replacement, you must file an intent to receive grade forgiveness with the registrar by the 12th day of class. Failure to file an intent to use grade forgiveness will result in both the original and repeated grade being used to calculate your overall grade point average. A student will receive grade forgiveness (grade replacement) for only three (undergraduate student) or two (graduate student) course repeats during his/her career at UT Tyler. (2006-08 Catalog, p. 35)

Prepared By: Edited By:	Prabha Sundaravadivel, Assistant Professor	Date:	8 January 2020
	Prabha Sundaravadivel, Assistant Professor		8 January 2023

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The University of Texas at Tyler
Department of Electrical Engineering

Course: EENG 3308.060 – Programming Languages for Design

COURSE OUTLINE

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Course Coordinator:

Dr. Prabha Sundaravadivel
Assistant Professor, Department of Electrical Engineering
Office: RBN 2015
Email: PSundaravadivel@uttyler.edu
Office Hours: W 2 PM - 5 PM
   Email and Canvas Discussion Boards.
Office hours Zoom ID: 923 4825 2912
   Passcode: 2023

Class Location/Time: Fully online course with recorded lectures

Grading Policy:

Quizzes	30%	Total 6-7
Mini Projects / Assignments	20%	Total – 4
Group Project	40%	
Class Participation	10%	Attendance 5%, Participation in Group Discussion and other activities 5%
Total	**100%**	

Semester Schedule (Tentative):

Week	Start Date	Topics Covered	Lecture (Tues)	Lecture (Thurs)	Mini Project
1	9-Jan	*MATLAB fundamentals*	Course Introduction *Matlab Fundamentals* - Setup, Variables	Functions, Basic Arithmetic Operations	
2	16-Jan	*MATLAB fundamentals*	Conditional statements, loops	Data Imports and Analysis	MATLAB OnRamp Certification
3	23-Jan	*MATLAB fundamentals*	Translate formulae into code, Toolboxes	2D and 3D Plotting	
4	30-Jan	*MATLAB examples*	Find Min and Max, Calculus	Differential Equations, Graphical User Interface	SIMULINK OnRamp Certification
5	6-Feb	*Python Programming Fundamentals*	Python Setup	Object	
6	13-Feb	*Python Programming Fundamentals*	Data Structure Basics	Comparison Operators	

7	20-Feb	*Python Programming Fundamentals*	Introduction to MicroPython	Methods and Functions	Mini Project-3
8	27-Feb	*Python Projects*	Python statements	Examples	
9	6-Mar	*Arduino Programming*	Setup, Programming Basics	Engineering Basics	
10	13-Mar		**Spring Break**		
11	20-Mar	*Arduino Programming*	User Input, Feedback	Sensors	
12	27-Mar	*Arduino Programming*	Robotics	Internet of Things	Mini Project-4
13	3-April	*Labview Fundamentals*	Types of data, Local Variable	structures & Loops	
14	10-April	*Labview Fundamentals*	Array, Numeric String,	Timing project, File and report	
15	17-April	*Project Demonstration*	Arduino-based projects	Pi-Pico based projects	
16	24-April		**Final Group Project Presentations**		

Mode of Delivery:

Online course. This course will be offered as a fully online course in this semester. Students are expected to review the recorded online lectures and complete the assignments on time. The course materials including lecture videos, pdfs and other assignment documents will be posted in the **CANVAS course** page. If the student has any concerns or would like to share their feedback on the lectures, email the Instructor anytime.

Flexible Online Office Hours:

Students can meet with the Instructor during the office hours on Wednesdays (2-5 PM) using the zoom ID: 923 4825 2912 passcode: 2023. However, if students are not available during the mentioned office hours, they are strongly encouraged to schedule a meeting with the Instructor anytime.

Quiz:

There will be a total of 6-7 quizzes in the class. This is to keep the students on track with the course content. The quizzes will include auto-graded coding assignments and multiple choice questions.

Mini-lab:

The Mini-lab is to help students test their knowledge of programming language through simple coding labs and certifications. This is to be completed by each student separately and should not be done as a group activity.

Group Project:

The final project will be based on Arduino boards. Using the programming knowledge acquired through the Arduino programming section, students are expected to build a simple robot. Students are expected to form a group of 3-4 for the final project. The robot can be a simple line

follower, accelerometer-based robot, time-control robot, object follower or object Repeller. The tentative schedule for project completion is:

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Abstract submission (5%) due on March 20, 2023

Final Report (10%) due on April 17, 2023

Project Presentation (20%) due on April 21, 2023

Project Showcase (5%) due on April 21, 2023

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The basic components required for building a moving robot will include a chasis kit, battery, Arduino board and relevant sensors. Though such kits are available in Amazon, students are strongly encouraged to purchase a kit based on their project requirement. The hardware components for such a robot will amount to approximately $25-$60. Here is an example: https://www.amazon.com/VKmaker-Avoidance-tracking-Ultrasonic-tutorial/dp/B01CXVA6IO
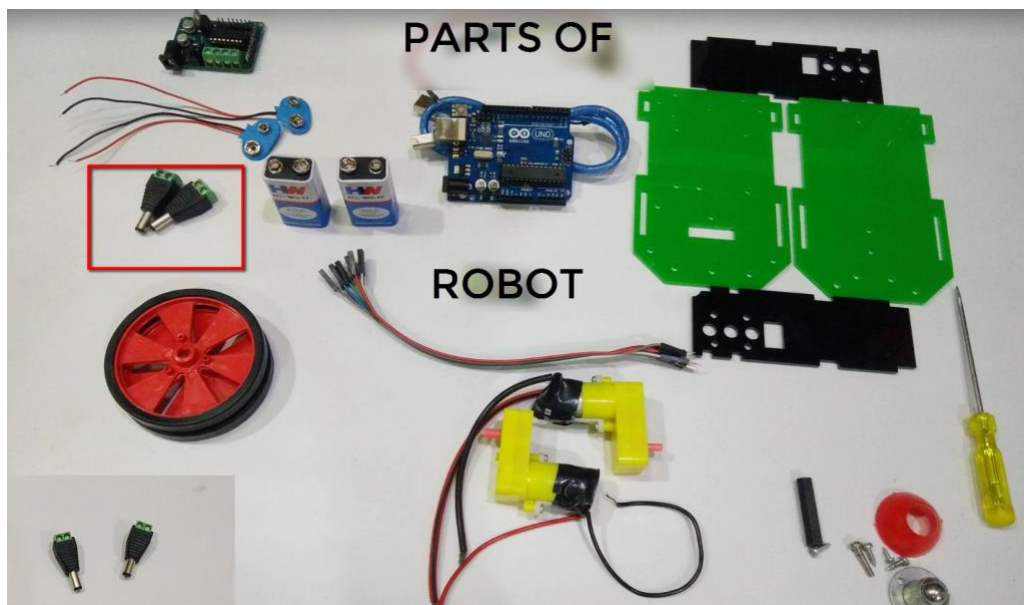
Attendance Policy and Class Participation:

Students are expected to complete all lectures on weekly basis. By signing up for the class it is understood that the student has checked for ANY significant recurring conflicts that might affect completion of the course requirements. Attendance will be monitored through timely completion of the submissions and quizzes. The progressive nature of the class means that perfect attendance is recommended if a good grade is desired. Class participation is graded based on attendance, involvement of student in the class activities.

Final Exam:
There is no final exam for this course.

How to be successful in this course:
As this is about learning 4 different programming languages in 1 semester, the focus will be more on hands-on experiments and lab modules, mini-projects and group projects. Though there are no high expectations for students to be an expert in programming in beginning of this course, regular

attendance, active involvement in the class and taking the initiative to learn/ advance programming skills beyond the class lectures is strongly encouraged to complete the course successfully.

Students Rights and Responsibilities

To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link: http://www.uttyler.edu/wellness/rightsresponsibilities.php

Grade Replacement/Forgiveness and Census Date Policies:

Students repeating a course for grade forgiveness (grade replacement) must file a Grade Replacement Contract with the Enrollment Services Center (ADM 230) on or before the Census Date of the semester in which the course will be repeated. Grade Replacement Contracts are available in the Enrollment Services Center or at http://www.uttyler.edu/registrar. Each semester's Census Date can be found on the Contract itself, on the Academic Calendar, or in the information pamphlets published each semester by the Office of the Registrar.

Failure to file a Grade Replacement Contract will result in both the original and repeated grade being used to calculate your overall grade point average. Undergraduates are eligible to exercise grade replacement for only three course repeats during their career at UT Tyler; graduates are eligible for two grade replacements. Full policy details are printed on each Grade Replacement Contract.

The Census Date is the deadline for many forms and enrollment actions that students need to be aware of. These include:

- Submitting Grade Replacement Contracts, Transient Forms, requests to withhold directory information, approvals for taking courses as Audit, Pass/Fail or Credit/No Credit.
- Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date)
- Schedule adjustments (section changes, adding a new class, dropping without a "W" grade)
- Being reinstated or re-enrolled in classes after being dropped for non-payment
- Completing the process for tuition exemptions or waivers through Financial Aid

State-Mandated Course Drop Policy

Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another 2-year or 4-year Texas public college or university. For purposes of this rule, a dropped course is any course that is dropped after the census date (See Academic Calendar for the specific date). Exceptions to the 6-drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Enrollment Services Center and must be accompanied by documentation of the extenuating circumstance. Please contact the Enrollment Services Center if you have any questions.

Disability Services

In accordance with federal law, a student requesting accommodation must provide documentation of his/her disability to the Disability Services counselor. If you have a disability, including a learning disability, for which you request an accommodation, please contact the Disability Services office in UC 3150, or call (903) 566-7079.

Student Absence due to Religious Observance

Students who anticipate being absent from class due to a religious observance are requested to inform the instructor of such absences by the second class meeting of the semester.

Student Absence for University-Sponsored Events and Activities

If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify the instructor at least two weeks prior to the date of the planned absence. At that time the instructor will set a date and time when make-up assignments will be completed.

Social Security and FERPA Statement:

It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number. The electronic transmission of grades (e.g., via e-mail) risks violation of the Family Educational Rights and Privacy Act; grades will not be transmitted electronically.

Emergency Exits and Evacuation:

Everyone is required to exit the building when a fire alarm goes off. Follow your instructor's directions regarding the appropriate exit. If you require assistance during an evacuation, inform your instructor in the first week of class. Do not re-enter the building unless given permission by University Police, Fire department, or Fire Prevention Services.

Happy Learning!