The University of Texas at Tyler
Department of Electrical Engineering

Course: EENG 2301 Programming Languages for Design

Syllabus

Catalog Description:

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.

Credits:

(**3** hours lecture, **0** hours laboratory per week)

Required Material(s):

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:
https://www.sparkfun.com/wish_lists/155452

Course Coordinator:

Dr. Prabha Sundaravadivel, Assistant Professor, Electrical Engineering

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, Object Oriented Programming, Modules and Packages, Error and Exceptions Handling; **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 Objectives[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. Utilize NI LabVIEW for a simple data acquisition system[1]
7. Design LabVIEW applications including virtual instruments. [4]
8. Analyze the user input and feedback system in Arduino programming. [1]
9. Implement basic project in the Arduino microcontroller integrated development environment. [5]
10. Analyze the significance of the given programming languages in current market. [3,6]
11. Explore the applications of Arduino in IoT and robotics. [5]

[1] Numbers in brackets refer to method(s) to evaluate the course objective

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

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; [5,7]
3. an ability to communicate effectively with a range of audiences; [10]
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; [11]
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions; [3,4,6,8]
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

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

Contribution to Meeting Professional Component: (in semester hours)

Mathematics and Basic Sciences:	0	hours
Engineering Sciences and Design:	3	hours
General Education Component:	0	hours

Prepared By: Prabha Sundaravadivel

Date: 8-Jan-2020

The University of Texas at Tyler
Department of Electrical Engineering

Course: EENG 2301.003 – Programming Languages for Design

COURSE OUTLINE

Course Coordinator:	**Dr. Prabha Sundaravadivel** Assistant Professor, Department of Electrical Engineering **Office:** RBN 2015 **Email:** PSundaravadivel@uttyler.edu **Office Hours:** Th 10 AM - 1 PM Email and Canvas Discussion Boards.

Class Location/Time: Th 6 PM- 8:45 PM, RBS 2024

Grading Policy:

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

Semester Schedule (Tentative):

Week	Date	Topics	
1	Jan 16	*Matlab Fundamentals* - Setup, Variables and functions, Basic Arithmetic Operations	
2	Jan 23	*Matlab Fundamentals* - , Conditional statements, loops, Data Imports and Analysis	*Mini Project 1*
3	Jan 30	*Matlab Fundamentals* - Translate formulae into code, Toolboxes, 2D and 3D Plotting	
4	Feb 6	*Matlab Examples and Projects* -Find Min and Max, Calculus and Differential Equations, Graphical User Interface	*Mini Project 2*
5	Feb 13	*Python Programming Fundamentals* - Python Setup, Object and Data Structure Basics, Comparison Operators	
6	Feb 20	*Python Programming Fundamentals* – Python Statements, Methods and Functions	*Mini Project 3*
7	Feb 27	*Python Programming Fundamentals* - Object Oriented Programming, Modules and Packages, Errors and Exceptions	

8	Mar 5	*Python Projects*	*Mini Project 4*
9	Mar 12	*Spring Break*	
10	Mar 19	*Arduino Programming* – Setup, Programming basics, Engineering Basics	
11	Mar 26	*Arduino Programming* - User Input, Feedback, Sensors	*Mini Project 5*
12	Apr 2	*Arduino Projects* – Robotics, Internet of Things	
13	Apr 9	*Labview Fundamentals* - Types of data, structures & Loops,	
14	Apr 16	*Labview Fundamentals* - Array, Numeric, String, Local Variable	*Mini Project 6*
15	Apr 23	*Labview Examples* - Timing Project, File & Report	
16	Apr 30	*Final Group Project Presentation*	

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.

Mini-Project:

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

Group Project:

Project will be based on Arduino boards. Students are expected to form a group of 3-4. A simple working robotics or IoT-based project is expected to be built. However, students are strongly encouraged to be creative and can choose their own project topic. The tentative schedule for project completion is:

Abstract submission (5%) due on April 6, 2020

Final Report (10%) due on April 30, 2020

Project Presentation (20%) due on April 30, 2020

Project Showcase (5%) due on April 30, 2020

Attendance Policy and Class Participation:

Students are expected to attend all scheduled lectures. By signing up for the class it is understood that the student has checked for ANY significant recurring conflicts with lecture meeting times (including work, family, or any other commitments). No exceptions can be made for attendance requirements as this will be unfair to the other students. The progressive nature of the class means that perfect attendance is recommended if a good grade is desired. No more than three excused absences for valid reasons are allowed and documentation should be submitted for each absence. The classroom setting will encourage and deploy active classroom techniques such as group

discussion, brainstorming and team-based learning. 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, 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 scheduled classes 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!