The University of Texas at Tyler
Department of Electrical Engineering

CMPE 3301: Foundations of Computer Engineering

Syllabus

Catalog Description:

Foundational topics in Computer Engineering: Circuit design using Computer Aided Design (CAD) tools; Printed Circuit Boards (PCB) Basics: Schematics, Board Layout, Verification, Bus; Single Board Computer: Command line programming, Linux fundamentals, Virtual Machines, Networking Basics, Web design; Introduction to 3D printing. Three hours of lecture each week.

Prerequisites: COSC 2336 Data Structures and Algorithms, MATH 2413 Calculus I
Pre- or Co-requisites: EENG 3302 Digital Systems Design, EENG 3306 Electronic Circuits Analysis I

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

Text(s): No Textbook

Required Material : Study material provided by instructor, Autodesk Fusion360, EAGLE PCB design software, Raspberry Pi board.

Course Coordinator: Dr. Prabha Sundaravadivel, Associate Professor

Topics Covered: (paragraph of topics separated by semicolons)

Softwares and technolgoies used in Computer Engineering. Computer Aided Design. Project development . Circuit design using Computer Aided Design (CAD) tools; Printed Circuit Boards (PCB) Basics: Schematics, Board Layout, Verification, Bus; Single Board Computer: Command line programming, Linux fundamentals, Virtual Machines, Networking Basics, Web design; Introduction to 3D printing.

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. Analyze the design flow for circuit modeling using CAD tools. [1]
2. Design circuit schematics using Eagle software. [4]
3. Analyze the errors in board layouts using DRC and ERC checks. [2]
4. Create Gerber files for the printed circuit boards. [1,2]
5. Configure a single board computer using Command Line Interface (CLI) programming. [1,2]
6. Analyze the steps involved in automation using Linux scripting. [2]
7. Design and implement web / user interface for data analytics. [5]
8. Configure virtual machines using single board computers. [6, 7]
9. Analyze the workflow models for 3D modeling and printing using Fusion 360. [6,7]

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

[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, Associate Professor	Date:	11 August 2021 15 August 2023

The University of Texas at Tyler
Department of Electrical Engineering

Course: CMPE 3301: Foundations of Computer Engineering

COURSE OUTLINE

Course Coordinator:

Dr. Prabha Sundaravadivel
Associate Professor, Department of Electrical and Computer Engineering
Office: RBN 2015
Email: PSundaravadivel@uttyler.edu
Office Hours: Monday 11-2
Email, Canvas Discussion Boards,
Zoom ID: 92348252912 **Passcode:** Fall2025

Class Location/Time: M/W 9:00 AM – 10:20 AM - RBN 2012

Grading Policy:

Attendance	5%	
Quizzes	15%	Total - 5
Mini Projects / Assignments	30%	Total – 3
Mid-Term	20%	
Final Project	30%	
Total	**100%**	

Semester Schedule (Tentative):

Week	Start Date	Topics Covered	Lecture (Monday)	Lecture (Wednesday)
1	08/25	*Introduction, Computer Aided Design (CAD)*	Course Introduction	CAD software's and significance
2	09/01	*Workflow models*	Design flow for circuit modeling and PCB modeling	Design flow for 3D modeling **Quiz-1**
3	09/08	*Circuit Schematics using CAD*	Circuit schematics in Eagle	Circuit schematics in TinkerCAD
4	09/15	*PCB design using Eagle*	Creating new panel and modeling the first project	Integrating libraries in Eagle **Mini-Project-1**
5	09/22	*PCB design using Eagle*	Controller and driver modeling in Eagle	Testing and validation **Quiz-2**
6	09/29	*PCB design using Eagle*	Beyond the Eagle software	**Mid-Term**
7	10/06	*Introduction to Single Board computers*	Computer Architecture basics	Architectures of microcontrollers

8	10/13	*Raspberry Pi setup*	Configure a raspberry pi board	Introduction to Micro Python **Mini-Project-2**
9	10/20	*Raspberry Pi*	Sensor Integration	Real-time applications
10	10/27	*Fusion 360*	Introduction to fusion 360	Circuit Design
11	11/02	*Fusion 360*	PCB Design	3D modeling **Mini-Project-3**
12	11/9	*Introduction to Linux*	Linux basics	Linux administration **Quiz-3**
13	11/16	*Virtual Machines*	Setting up Virtual Machines	Executing Linux commands **Quiz-4**
14	11/23	Thanksgiving Holiday		
15	11/30	*Review*	Final Project Implementation	
16	12/07	**Final Project Report**		

Mode of Delivery:

This course will have in-person classes, live Zoom sessions, and recorded lectures. Attendance is mandatory for in-person and synchronous Zoom classes, unless specified otherwise. Recorded lectures will be available on Canvas within their respective modules. Students must watch these lectures, review given materials, and stay updated on weekly course content. Feel free to email the instructor with concerns or feedback about the lectures.

Flexible Online Office Hours:

Students can meet with the Instructor during office hours on Mondays (11-1) at her office in RBN 2015 or using the zoom link. 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 5 quizzes in the class that covers the theoretical concepts. The quizzes will be blended as part of the course module for each week. This is to keep the students on track with the course content. Quizzes will be conducted through Canvas.

Mini-Project:

The Mini-Project is to help students evaluate your implementation skills with respective topics. Students will be given simple challenge statements based on which they are expected to design an IoT ecosystem. The course will contain 3 mini-projects.

Final Project:

The final project will be evaluated based on computer engineering tools. Students are required to build a sustainable monitoring framework that can be deployed in real-time. This will include an abstract, project implementation and evaluation. Projects will be based on Arduino / Raspberry Pi boards. Students can either form a group or complete this project individually. A simple working 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 due (5%) on October 4, 2025

Project prototype (15%) due on Nov 29, 2025

Project report (10%) due on December 7, 2025

Attendance Policy and Class Participation:

Students are expected to complete reviewing all the posted lectures and materials every week. By signing up for the class, it is understood that the student has checked for ANY significant recurring conflicts that might affect the 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 and involvement of students in the class activities.

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

How to be successful in this course:
This course is targeted for beginner-level Computer Engineering students. As there are several relevant topics and a high-demand job market, the course materials are designed with blended entrepreneurial components. To be successful in this course, complete all the materials on time so that any concerns or questions can be discussed with the instructor during the week. Though there are no high expectations for students to be an expert in programming at the beginning of this course, active involvement in the class and taking the initiative to learn/ advance programming and implementation 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 semester's Census Date 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.
Please file a Grade Replacement Contract to avoid 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 during class's first week. Do not re-enter the building unless given permission by University Police, Fire department, or Fire Prevention Services.

Happy Learning!