



## **Department of Engineering Technology**

College of Science and Engineering Technology  
SAM HOUSTON STATE UNIVERSITY

### **COURSE SYLLABUS**

### **ETEC 3376 MICROCONTROLLER APPLICATIONS**

**Fall 2017**

**Department:** Engineering Technology

**Course Name/ Title:** ETEC 3376 Microcontroller Applications - 82581

**Semester:** Fall 2017

**Credit:** 3 Hours (2-2 Format)

**Location/Time:** Pirkle 220 (Lecture) and Pirkle 140 (Lab), Tue/Thurs: 8:00am – 9:50am

**Instructor:** Iftekhar Ibne Basith

**Office:** Pirkle 420F

**Email:** iib002@shsu.edu

**Phone:** 936-294-4139

**Office Hours:** Mon/Wed 11am - 12pm or by appointment

**Course Catalog Description:** This course introduces microcontroller architecture and microcomputer systems including memory and input/output interfacing. Topics include low-level language programming, bus architecture, I/O systems, memory systems, interrupts, and other related topics. The student will learn the functional and technological characteristics of microcontroller structures, memory components, peripheral support devices, and interface logic. Various hardware configurations and interfacing techniques will be covered. Application-oriented laboratory experiments and design problems will be part of the course requirements.

**Suggested Textbook/Workbook:** What's a Microcontroller? by Andy Lindsay. Version 3.0 Parallax Inc., 2009. ISBN# 9781928982524. (Will be provided by the instructor).

Exploring Arduino: Tools and Techniques for Engineering Wizardry, by Jeremy Blum, Publisher: John Wiley & Sons, Inc. ISBN-13: 978-1118549360, Edition: 1<sup>st</sup>, Year: 2013

Arduino Home Automation Projects, by Marco Schwartz, Publisher: Packt Publishing Ltd. ISBN: 978-1-78398-606-4, Year: July 2014

Arduino Development Cookbook, by Cornel Amariei, Publisher: Packt Publishing Ltd. ISBN: 978-1-78398-294-3, Year: April 2015

The Arduino Starter Kit – Skill level Beginner. (Will be provided by the instructor).

**Required Laboratory Kit:** Arduino Project Books - The Arduino Starter Kit – Skill level Beginner. (Will be provided by the instructor).

**Required Supplies:** A notebook and a Texas Instruments scientific/engineering type calculator.

**Course Objectives:** Students who successfully complete this course are expected to meet the following course outcomes:

- Understand embedded technology and system components
- Understand the general Microprocessor and Microcontroller Architectures
- Describe the architecture and organization of a microcontroller
- Able to write structured, well-commented, understandable programs in basic stamp language
- Possess the skills to test and debug microcontroller programs in the laboratory
- Understand techniques for interfacing I/O devices to the microcontroller, including several specific standard I/O devices
- Discuss the differences between low level, mid level and high level languages
- Program the I/O ports for various process control applications

- Discuss the bus concepts, microcontroller hardware, and interfacing concepts

**Class Structure and Attendance:** This is an important fundamental class and your attendance is highly encouraged. *Lectures, in-class problems and discussions, laboratory experimental projects, and homework assignments* will constitute the structure of the course. The make-up labs and exams will be given only in the case of **documented physical illness** (**In this case, students must inform instructor at least 24 hours before the exam**).

**Homework Assignments:** Homework assignments will be available through SHSU Blackboard or handed during the class. The HW assignments will be collected or uploaded HW's will be graded by Instructor and be available to students after completion of each HW assignment. The HW assignments will not be available to the students after the due dates. No credit will be given for late/missed homework assignments. The best two HW will be counted **only** on the condition that **you submit all the HW on time and within deadline**. If you miss any single deadline for HW submission, then the average of the HW will be considered for your grade.

**Blackboard Use:** Presentations, course syllabus, Lab/HW assignments will be available in blackboard system. All the HW assignments might be completed through Blackboard systems. Please pay attention to the due dates.

**Grading Scale:** The final grade will be based on the following requirements.

<b>Mid-term Test</b>	<b>15%</b>	
<b>Final Exam</b>	<b>15%</b>	
<b>Laboratory Experiments</b>	<b>45%</b>	
<b>Homework Assignments (Best Two of Minimum Three)</b>	<b>5%</b>	
<b>Attendance, Observed performance, Attitude</b>	<b>10%</b>	
<b>Group Project</b>	<b>10%</b>	
<b>Total</b>	<b>100%</b>	

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

**Classroom Rules of Conduct:** Students will avoid doing behavior in the classroom that intentionally or unintentionally disrupts the learning process and, thus, obstructs the mission of the university. Cellular *telephones* and *paggers* must be turned off before class begins. Students are prohibited from *eating in class, using tobacco products, making offensive remarks, reading newspapers, sleeping, talking at inappropriate times, or engaging in any other form of distraction*. Inappropriate behavior in the classroom shall result in a directive to leave class. Students who are especially disruptive also may be reported to the Dean of Students for disciplinary action in accordance with university policy.

**Course Content and Lab Schedule:** The tentative course content schedule will include the following topics. Depending upon extra handouts//homework assignment explanations, ***the tentative course content may be shifted slightly later in the semester.***

<b>ETEC 3376 Microcontroller Applications, Fall 2017</b>		
<b>Week</b>	<b>Date</b>	<b>Subject</b>
<b>1</b>	8/24	Introduction to the Course
<b>2</b>	8/29 8/31	Introduction to Laboratory Kit, Equipment and Parts <b>Lecture 1</b>
<b>3</b>	9/5 9/7	<i>University Holiday – Labor Day</i> <b>Lecture 1 Continue</b> <b>HW#1</b>
<b>4</b>	9/12 9/14	Lab #1 – Spaceship Interface Lab #2 – Love-o-Meter
<b>5</b>	9/19  9/21	<b>Lecture 2</b> <b>HW#2</b> Lab #3 – Color Mixing Lamp
<b>6</b>	9/26  9/28	<b>Lecture 3</b> <b>HW#3</b> Lab #4 – Mood Cue
<b>7</b>	10/3  10/5	<b>Lecture 4</b> <b>HW#4</b> <b>Do your OWN LAB day</b> <b>(Visit <a href="http://www.arduino.org">www.arduino.org</a> and find one example of your choice and do it in lab)</b>
<b>8</b>	10/10 10/12	Lab #6 – Light Theremin <i>Mid-Term Test</i>
<b>9</b>	10/17 10/19	<b>Lecture 5</b> <b>HW#5</b> Lab #7 – Keyboard Instrument
<b>10</b>	10/24 10/26	Lab #8 – Digital Hourglass Lab #9 – Motorized Pinwheel
<b>11</b>	10/31 11/2	Lab #10 – Zoetrope Lab #11 – Crystal Ball
<b>12</b>	11/7 11/9	Lab #12 – Knock Lock Lab #13 – Touchy-feely Lamp
<b>13</b>	11/14 11/16	Lab #14 – Tweak the Arduino Logo <i>Thanksgiving Holiday – No Classes</i>
<b>14</b>	11/21 11/23	Lab #15 – Hacking Buttons <b>(Visit <a href="http://www.arduino.org">www.arduino.org</a> and find another example of your choice and do it in lab)</b>
<b>15</b>	11/28 11/30	Final Project Presentation Final Test Review
<b>16</b>	<b>12/4 - 12/7</b>	<b>FINALS</b>

## Laboratory Instructions

**Laboratory Assignments:** There are regular labs will be announced by the instructor during the lectures for this course. All laboratory project assignments must be completed for your lab grading. You must obey departmental laboratory safety rules & policies. ***You must attend and successfully complete each lab.*** Before each Lab, please prepare yourself enough by reading the objective, procedure and theory from the required workbook pages. LAB reports due dates are provided in the tentative schedule. Make sure you write clearly and neatly! If you miss any LAB you will lose points (30) for that corresponding LAB (**make up labs are only allowed in case of documented illness**).

*Note: It is the student's responsibility to arrange make-up labs with the instructor/TA. Make-up labs may be considered with a report proven medical reason.*

### Rules and Recommendations for Effective and Safe Use of the Laboratory and Work Benches in Pirkle 140 (Electronics Lab)

1. ***DO NOT turn on the power before the instructor checks your circuit!***
2. Use the coat racks for neat laboratory appearance as well as safety. Do not place coats or book bags on workbenches.
3. Refrain from drinking beverages in the laboratory. The hall may be used for intervals of relaxation.
4. ***The lab bench must be cleaned and all wires must be returned to the hooks provided in the lab room before leaving the room.***
5. Report all component and equipment failures to your Instruct or lab TA. Neglecting to report faulty equipment causes problems for the next group that uses the bench and may result in injuries.
6. When using the instruments ***DO NOT STACK THEM***, as the combined heat may cause component failure.
7. Place all of the trainer units, transformers, motors, DMMs, resistors, inductors, capacitors, etc., back to their original places and/or *original rated* boxes after you are done with the laboratory.
8. ***All power switches should be turned off before leaving the lab bench.***
9. Rings and other jewelry, which may cause a potential hazard, must be removed before working in the laboratory.
10. No individual should operate equipment in the laboratory until the appropriate examinations are passed and/or demonstrations by instructor are safely observed.

### **Lab Submission Procedure**

*Save your LAB as "LABNUMBER\_LASTNAME\_SAMID\_ETEC 3376\_FALL2017" and show output to the instructor. Write a single page report about what have you done and learned from the LAB and convert to pdf; name it as "LABNUMBER\_LASTNAME\_SAMID\_ETEC 3376\_FALL2017"; upload it to blackboard for grading. Only one **single pdf** file is accepted; **no picture** files, **no multiple** files. You can use the app "**CamScanner**" for this purpose. Download it free from app store and use it.*

<b>General Safety Procedures – Introduced by the instructor</b>	
<b>I. Introduction: How Electricity Works</b> <ul style="list-style-type: none"> <li>a. Conductors</li> <li>b. Insulators</li> <li>c. Grounding</li> </ul>	<b>II. Hazards of Electricity</b> <ul style="list-style-type: none"> <li>a. Electrical shock</li> <li>b. Electrical burns</li> <li>c. Electrical fires</li> <li>d. Case Studies of Electrical Accidents</li> </ul>
<b>III. Types of Electrical Hazards</b> <ul style="list-style-type: none"> <li>a. Working on energized (hot) circuits</li> <li>b. Loose connections</li> <li>c. Frayed or missing insulation</li> <li>d. Missing ground prongs on plugs</li> <li>e. Water and electricity don't mix</li> <li>f. Damaged power tools</li> <li>g. Ungrounded equipment</li> <li>h. Improper use of extension cords</li> </ul>	<b>IV. How to Protect Yourself from Electricity</b> <ul style="list-style-type: none"> <li>a. General electrical safety rules</li> <li>b. Properly grounded electrical circuits</li> <li>c. Ground fault protection near water sources</li> <li>d. Insulated power tools</li> <li>e. Proper housekeeping</li> <li>f. Don't overload circuits</li> </ul>
<b>V. Soldering Hazards</b> <ul style="list-style-type: none"> <li>a. General soldering safety rules</li> <li>b. Proper handling of soldering equipment</li> </ul>	

**Academic Dishonesty:** All students are expected to engage in all academic pursuits in a manner that is above reproach. Students are expected to maintain honesty and integrity in the academic experiences both in and out of the classroom. Any student found guilty of dishonesty in any phase of academic work will be subject to disciplinary action. The University and its official representatives may initiate disciplinary proceedings against a student accused of any form of academic dishonesty including but not limited to, cheating on an examination or other academic work which is to be submitted, plagiarism, collusion and the abuse of resource materials.

**Student Absences On Religious Holy Days Policy:** Section 51.911(b) of the Texas Education Code requires that an institution of higher education excuse a student from attending classes or other required activities, including examinations, for the observance of a religious holy day, including travel for that purpose. A student who is excused under this subsection may not be penalized for that absence and shall be allowed to take an examination or complete an assignment from which the student is excused within a reasonable time after the absence. University policy 861001 provides the procedures to be followed by the student and instructor. A student desiring to absent himself/herself from a scheduled class in order to observe (a) religious holy day(s) shall present to each instructor involved a written statement concerning the religious holy day(s). This request must be made in the first fifteen days of the semester or the first seven days of a summer session in which the absence(s) will occur. The instructor will complete a form notifying the student of a reasonable timeframe in which the missed assignments and/or examinations are to be completed.

**Disabled Student Policy:** It is the policy of Sam Houston State University that individuals otherwise qualified shall not be excluded, solely by reason of their disability, from participation in any academic program of the university. Further, they shall not be denied the benefits of these programs nor shall they be subjected to discrimination. Students with disabilities that might affect their academic performance should register with the Office of Services for Students with Disabilities located in the Lee Drain Annex (telephone 936-294-3512, TDD 936-294-3786, and e-mail [disability@shsu.edu](mailto:disability@shsu.edu)). They should then make arrangements with their individual instructors so that appropriate strategies can be considered and helpful procedures can be developed to ensure that participation and achievement opportunities are not impaired.

SHSU adheres to all applicable federal, state, and local laws, regulations, and guidelines with respect to providing reasonable accommodations for students with disabilities. If you have a disability that may affect adversely your work in this class, then I encourage you to register with the SHSU Services for Students with Disabilities and to talk with me about how I can best help you. All disclosures of disabilities will be kept strictly confidential. NOTE: No accommodation can be made until you register with the Services for Students with Disabilities. For a complete listing of the university policy, see:

<http://www.shsu.edu/dept/academic-affairs/documents/aps/students/811006.pdf>

**Tobacco Policy:** In order to promote a healthy, safe, and aesthetically pleasing work, educational, and living environment, Sam Houston State University (SHSU) will endorse a smoke free and tobacco free environment. The primary purpose of this policy is to establish guidelines prohibiting smoking and the use of all tobacco products. Tobacco products include cigarettes, cigars, pipes, smokeless tobacco, and all other tobacco products. This policy applies to all faculty, staff, students, employees of contractors, and visitors of Sam Houston State University on the premises of the university.

**Visitors in the Classroom:** Only registered students may attend class. Exceptions can be made on a case-by-case basis by the professor. In all cases, visitors must not present a disruption to the class by their attendance. Students wishing to audit a class must apply to do so through the Registrar's Office.

***“The above schedule, policies, and assignments in this course are subject to change in the event of extenuating circumstances or by mutual agreement between the instructor and the students.”***

**SHSU Blackboard:** Please see below. All the course documents are located under “Course Documents” tab.

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Campus Tools Blackboard E-Mail My Sam SamWeb SHSU Online

Getting Started Majors & Programs Admissions Campus Life & Culture Resources Athletics About SHSU

Future Students  
Current Students  
Graduate Students  
SHSU Online  
Alumni & Friends  
Research & Recognition  
Faculty & Staff  
Maps & Contacts

**A Novel Approach**

When senior Laura Toeniskoetter had a story to tell, she utilized all the resources she could to reach her ultimate goal—self-publishing her 300-page mystery.

**Today@Sam**

**Kinesiology Prof Receives Prestigious Awards**

Jose Santiago, associate professor of kinesiology at SHSU, recently was recognized for his excellence and leadership.

**Upcoming Events**

**SHSU Closed for Winter Break**

SHSU will be closed Dec. 23 through Jan. 1 for winter break. Business will resume at 8 a.m. on Jan. 4.

**Spring 2016 Semester Move-In**

Residence halls open for spring occupancy at

**KatSafe Info**

**Give to SHSU**

**Resources**

Student Preview mode is ON

SettingsExit Preview

Technical Support

Spring 2016 ETEE 1340  
01 Electronics  
1

COURSE COMMUNICATION

Notifications  
My Grades  
Send Email


COURSE CONTENT  
Co

COURSE INFORMATION  
Online Learning Technical Requirements

HELP & HOW-TO  
Bb Student Orientation  
Blackboard Help  
Bb.com Video Tutorials For Students  
YouTube how-to videos for the ASET Dept


Course Documents

Chapter's



**Students** = select this link to view all of the resources for each chapter. You will find all presentations, videos, resource files, etc.... inside of this "folder".

Home Work

  
KEEP  
CALM  
DO THAT  
HOMEWORK

**Students** = select this link to take and complete the Home Work required for each chapter, they will be made available to as outlined in the course syllabus inside of this "folder".