

## **EE306: Introduction to Computing**

### **Fall 2019**

#### **Course:**

EE306; Unique #: 15860, 15865, 15870, 15875

#### **Lecture:**

TTH 9:30-11:00 AM in UTC 3.102

#### **Recitation Sessions:**

15860 meets F 1-2pm in ECJ 1.304

15865 meets F 2-3pm in ECJ 1.304

15870 meets F 3-4pm in ECJ 1.304

15875 meets F 4-5pm in ECJ 1.304

#### **Instructor:**

**Dr. Nina K. Telang**

Office Hours in EER 4.808 starting the week of 9/3:

**T 11:30-1:30pm**

**W 1:30-3:30pm**

**TH 11:30-1:30pm**

(OFFICE HOURS MAY BE CANCELLED ON SOME DAYS. Make up hours will be announced in class and on Canvas.)

Email: [telang@ece.utexas.edu](mailto:telang@ece.utexas.edu)

#### **Teaching Assistants and undergrad assistants:**

Will be announced on Canvas.

#### **Text:**

*Introduction to Computing Systems*, 3<sup>rd</sup> edition by Yale Patt & Sanjay Patel, McGraw Hill, 2019

ISBN: 9781307484618

#### **Course Objectives:**

This is the first course in computing for students of computer engineering and electrical engineering. The objective is to provide a strong foundation that a serious student can build on in later courses across the spectrum of computer science and engineering. The idea is that a more complete understanding of the fundamentals will help a student acquire a deeper understanding of more advanced topics, whether that topic is in computer architecture, operating systems, data base, networks, algorithm design, software engineering, or whatever. The approach is "motivated" bottom-up. Starting with the transistor as a switch, we build logic gates, then more complex logic structures, then gated latches, culminating in an implementation of memory. From there, we study the computer's instruction cycle, and then a particular computer, the LC-3 (for Little

Computer 3). The LC-3 captures the important structures of a modern computer, while keeping it simple enough to allow full understanding.

**Prerequisites:**

Students enrolled in EE306 are supposed to have received credit with a grade of at least C- or registration for Mathematics 408C. No formal programming experience is expected.

**Attendance:**

You are **expected to attend** each and every lecture. We will be doing in-class group exercises and pop-quizzes, and you will be evaluated on your classroom participation.

**Class notes, and laptop usage in class:**

Taking good class notes is very important for your success in this course. Please bring your notebook to class and take handwritten notes. We will also be writing computer programs in class, so please bring your laptop as well. Laptops can be used only for this purpose.

**Programming Assignments:**

All programming assignments will be in the assembly language of the LC-3. We cover good programming style and practice, and teach debugging from the get go. An LC-3 Simulator allows the student to debug his/her own programs. Input (via the keyboard) and output (via the monitor) both use the physical device registers. System service routines, written in LC-3 Assembly Language, are used to perform I/O functions. They are invoked by user programs by the TRAP instruction and corresponding trap vector. Subroutine calls and returns complete the LC-3 instruction set.

**All programming assignments must be completed individually. No collaboration on any programming assignment will be tolerated. Cheating and plagiarism of code will be considered to be a violation of the university honor code.**

**Homework Assignments:**

Homework assignments will be assigned (in addition to programming assignments). See the semester schedule below for tentative dates for homework and programming assignments. Homework assignments must be submitted online on Canvas by the due date and time. No hard copies of the homework will be accepted.

**Exams:**

Three midterm exams will be held in class during the normal lecture times. The tentative dates are listed in the schedule. The final exam will be held according to the university schedule. The final exam score can replace the lowest midterm score if it benefits the student.

**Grading:**

Homework	10 %
Classwork (Canvas pop quizzes, group work etc.)	10 %
Programming Assignments	25 %
Exam 1	10 %
Exam 2	10 %
Exam 3	10 %
Final	25 %

**Lecture Schedule:** Read chapters before coming to class.

<b>Lectures</b>	<b>Topics</b>	<b>Chapter</b>
8/29	Course Introduction; Hardware vs. Software; Computers as Universal Computational Devices;	Chapter 1
9/3, 9/5	Bits, Integer representations; Logical Operations: AND, OR, NOT; Other data type representations	Chapter 2
9/10, 9/12	Transistors, Gates – NOT, OR, NOR, AND, NAND; DeMorgan's Law; Combinational Logic Circuits	Chapter 3
9/17, 9/19	Storage Elements; Concept of Memory; Sequential Logic Circuits – Finite State Machines	Chapter 3
9/24, 9/26	Von Neumann Model of Computation; Fetch-Decode-Execute-Store, LC-3 ISA <b>Midterm # 1 (9/26) Chapters 1-3</b>	Chapter 4, 5
10/1, 10/3	Problem Solving; Online Debugging	Chapter 5, 6
10/8, 10/10	LC-3 Assembly Language	Chapter 6
10/15, 10/17	LC-3 Assembly Language	Chapter 6, 7
10/22, 10/24	Stored Program in LC-3 ISA; Assembly Language and the Assembler <b>Midterm # 2 (10/24) Chapter 4-7</b>	Chapter 7, 8
10/29, 10/31	Physical I/O; TRAP routines	Chapter 8, 9
11/5, 11/7	TRAP Routines, Subroutines	Chapter 9
11/12, 11/14	Subroutines	Chapter 9
11/19, 11/21	Stack, Interrupt Processing <b>Midterm # 3 (11/21) Chapters 5-9</b>	Chapter 10
11/26	Interrupt Processing, TG (no lecture on 11/28)	Chapter 10
12/3, 12/5	Stack calculator example, Review for final exam	
<b>12/14 7pm-10pm</b>	<b>Final Exam (this is tentative – the date will be finalized by the registrar in the last week of the semester)</b>	

**Homework and Programming Assignment Schedule (An announcement will be made in class if there is a change). Note that dates are tentative!**

**ALL ASSIGNMENTS NEED TO BE SUBMITTED ONLINE (the dates listed are the dates when submissions need to be made by 8:59pm. Homework assignments**

**must be submitted on Canvas, programming assignments need to be submitted on Git)**

Homework #1	9/13 (Fri)	
Homework #2	9/20 (Fri)	
Homework #3	9/24 (Tue)	
Homework #4	10/4 (Fri)	
Programming Assignment #1	10/12 (Sat)	
Programming Assignment #2	10/19 (Sat)	
Homework #5	10/22 (Tue)	
Homework #6	11/1 (Fri)	
Programming Assignment #3	11/9 (Sat)	
Programming Assignment #4	11/30 (Sat)	Needs to be checked out by TA
Programming Assignment #5	12/5 (Thu)	Needs to be checked out by TA

**Policy for late assignments (both homework and programming):**

A 30 minute grace period is given to each assignment. This means that if the submission is made by 9:29 pm (rather than the due time of 9:00 pm) it will not be marked late.

Assignments that are from 31 minutes to 2 hours late will be given a 10% penalty, from 2 hours to 12 hours late will be given a 50% penalty, after which no credit will be given.

Please **do not** approach the TA or instructor requesting exceptions to this policy **unless there is a medical or family emergency!**

# Policies

## Classroom Policies

### Statement on Learning Success

Your success in this class is important to me. We will all need accommodations because we all learn differently. If there are aspects of this course that prevent you from learning or exclude you, please let me know as soon as possible. Together we'll develop strategies to meet both your needs and the requirements of the course. I also encourage you to reach out to the student resources available through UT. Many are listed on this syllabus, but I am happy to connect you with a person or Center if you would like.

### Grading Policies

Grade	Cutoff
A	93.3%
A-	90%
B+	86.7%
B	83.3%
B-	80%
C+	76.7%
C	73.3%
C-	70%
D	65%
F	<65%

## Student Rights & Responsibilities

- You have a right to a learning environment that supports mental and physical wellness.
- You have a right to respect.
- You have a right to be assessed and graded fairly.
- You have a right to freedom of opinion and expression.
- You have a right to privacy and confidentiality.
- You have a right to meaningful and equal participation, to self-organize groups to improve your learning environment.
- You have a right to learn in an environment that is welcoming to all people. No student shall be isolated, excluded or diminished in any way.

With these rights come responsibilities:

- You are responsible for taking care of yourself, managing your time, and communicating with the teaching team and with others if things start to feel out of control or overwhelming.
- You are responsible for acting in a way that is worthy of respect and always respectful of others.
- Your experience with this course is directly related to the quality of the energy that you bring to it, and your energy shapes the quality of your peers' experiences.
- You are responsible for creating an inclusive environment and for speaking up when someone is excluded.
- You are responsible for holding yourself accountable to these standards, holding each other to these standards, and holding the teaching team accountable as well.

#### Personal Pronoun Preference

Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by a name different than what appears on the roster, and by the gender pronouns you use. Please advise me of this preference early in the semester so that I may make appropriate changes to my records.

#### University Policies

##### Academic Integrity

Each student in the course is expected to abide by the University of Texas Honor Code: **"As a student of The University of Texas at Austin, I shall abide by the core values of the University and uphold academic integrity."**

**Plagiarism is taken very seriously at UT.** Therefore, if you use words or ideas that are not your own (or that you have used in previous class), you must cite your sources. Otherwise you will be guilty of plagiarism and subject to academic disciplinary action, including failure of the course. You are responsible for understanding UT's Academic Honesty and the University Honor Code which can be found at the following web address:

[http://deanofstudents.utexas.edu/sjs/acint\\_student.php](http://deanofstudents.utexas.edu/sjs/acint_student.php)

##### Q Drop Policy

If you want to drop a class after the 12th class day, you'll need to execute a Q drop before the Q-drop deadline, which typically occurs near the middle of the semester. Under Texas law, you are only allowed six Q drops while you are in college at any public Texas institution. For more information, see:

<http://www.utexas.edu/ugs/csacc/academic/addddrop/qdrop>

## University Resources for Students

Your success in this class is important to me. We will all need accommodations because we all learn differently. If there are aspects of this course that prevent you from learning or exclude you, please let me know as soon as possible. Together we'll develop strategies to meet both your needs and the requirements of the course. There are also a range of resources on campus:

### *Services for Students with Disabilities*

This class respects and welcomes students of all backgrounds, identities, and abilities. If there are circumstances that make our learning environment and activities difficult, if you have medical information that you need to share with me, or if you need specific arrangements in case the building needs to be evacuated, please let me know. I am committed to creating an effective learning environment for all students, but I can only do so if you discuss your needs with me as early as possible. I promise to maintain the confidentiality of these discussions. If appropriate, also contact Services for Students with Disabilities, 512-471-6259 (voice) or 1-866-329- 3986 (video phone).  
<http://ddce.utexas.edu/disability/about/>

### *Counseling and Mental Health Center*

Do your best to maintain a healthy lifestyle this semester by eating well, exercising, avoiding drugs and alcohol, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress.

All of us benefit from support during times of struggle. You are not alone. There are many helpful resources available on campus and an important part of the college experience is learning how to ask for help. Asking for support sooner rather than later is often helpful.

If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, we strongly encourage you to seek support.  
<http://www.cmhc.utexas.edu/individualcounseling.html>

### *The Sanger Learning Center*

Did you know that more than one-third of UT undergraduate students use the Sanger Learning Center each year to improve their academic performance? All students are welcome to take advantage of Sanger Center's classes and workshops, private learning specialist appointments, peer academic coaching, and tutoring for more than 70 courses in 15 different subject areas. For more information, please visit  
<http://www.utexas.edu/ugs/slc> or call 512-471-3614 (JES A332).

*Undergraduate Writing Center:* <http://uwc.utexas.edu/>

*Libraries:* <http://www.lib.utexas.edu/>

*ITS:* <http://www.utexas.edu/its/>

*Student Emergency Services:* <http://deanofstudents.utexas.edu/emergency/>

### Important Safety Information:

If you have concerns about the safety or behavior of fellow students, TAs or Professors, call BCAL (the Behavior Concerns Advice Line): 512-232-5050. Your call can be anonymous. If something doesn't feel right – it probably isn't. Trust your instincts and share your concerns.

### *Title IX Reporting*

Title IX is a federal law that protects against sex and gender-based discrimination, sexual harassment, sexual assault, sexual misconduct, dating/domestic violence and stalking at federally funded educational institutions. UT Austin is committed to fostering a learning and working environment free from discrimination in all its forms. When sexual misconduct occurs in our community, the university can:

1. Intervene to prevent harmful behavior from continuing or escalating.
2. Provide support and remedies to students and employees who have experienced harm or have become involved in a Title IX investigation.
3. Investigate and discipline violations of the university's relevant policies.

Faculty members and certain staff members are considered "Responsible Employees" or "Mandatory Reporters," which means that they are required to report violations of Title IX to the Title IX Coordinator. **I am a Responsible Employee and must report any Title IX related incidents** that are disclosed in writing, discussion, or one-on-one. Before talking with me, or with any faculty or staff member about a Title IX related incident, be sure to ask whether they are a responsible employee. If you want to speak with someone for support or remedies without making an official report to the university, email [advocate@austin.utexas.edu](mailto:advocate@austin.utexas.edu) For more information about reporting options and resources, visit [titleix.utexas.edu](http://titleix.utexas.edu) or contact the Title IX Office at [titleix@austin.utexas.edu](mailto:titleix@austin.utexas.edu).

The following recommendations regarding emergency evacuation from the Office of Campus Safety and Security, 512-471-5767, <http://www.utexas.edu/safety/>

Occupants of buildings on The University of Texas at Austin campus are required to evacuate buildings when a fire alarm is activated. Alarm activation or announcement requires exiting and assembling outside.

- Familiarize yourself with all exit doors of each classroom and building you may occupy. Remember that the nearest exit door may not be the one you used when entering the building.
- Students requiring assistance in evacuation shall inform their instructor in writing during the first week of class.
- In the event of an evacuation, follow the instruction of faculty or class instructors. Do not re-enter a building unless given instructions by the following: Austin Fire Department, The University of Texas at Austin Police Department, or Fire Prevention Services office.
- Link to information regarding emergency evacuation routes and emergency procedures can be found at:

[www.utexas.edu/emergency](http://www.utexas.edu/emergency)