

## Fall 2019

- Facilitator:** Savan Suri  
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- Office:** 1006 Engineering Science Building (ESB)
- Office Hours:** Thursdays 10AM – 12PM or by appointment
- Co-Requisite:** EE 251 (Digital Electronics)
- Sections:** 001 Tuesday 5:00 PM -7:50 PM

**Course Description:** (1 credit hour) Design, fabrication, and measurement of digital electronic circuits. Modeling and use of discrete devices, logic gates, display devices in switching circuits and timer circuits, Interfacing with integrated logic gates.

### Learning Outcomes:

1. Be familiar with laboratory equipment (digital multimeter, digital oscilloscope, function generator, DC power supply, and curve tracer).
2. Be able to design and conduct engineering experiments, to test theory, verify performance or find faults, to troubleshoot a system using good techniques.
3. Be able to analyze and interpret engineering data from experiments and simulations.
4. Develop circuit models of devices from data taken on a curve tracer and manufacturer data sheets, and use them to design circuits.
5. Analyze RTL, TTL, CMOS, and Bi-CMOS digital gates to determine terminal specifications.
6. Information literacy.
7. Be able to work effectively in a group and identify personal group skills.

### Required Materials:

- a. **Lab Kit:** Each student is expected to bring an Electrical Engineering Laboratory Kit to lab each week.
- b. **Computation Notebook:** Used to keep notes, results and any other information pertaining to the lab by the student for each lab experiment.
- c. **Course Textbook:** Many of the labs reference material in your book.
- d. **USB Drive:** Your USB Drive will be used to transfer data off specific equipment.

**Lab Access Rules:** Students in this course will be given card access to this laboratory space to be used appropriately. The following rules apply to all students. If students are caught not following the rules, their card access will be revoked for the rest of the semester.

1. **Each** must student swipe in when they arrive. Wait 8 seconds between swipes.
2. Don't leave the door open.
3. Each student swipe again when they leave for the session.
4. Allowed access has been set for Monday - Sunday between 8am thru Midnight.
5. If you find that something is broken or not normal, please email your facilitator (s) as needed.
6. Any scheduled courses in the room have priority on equipment usage.

**Missed Lab:** Students are expected to attend every laboratory session. **Not attending a lab session will result in a grade of zero for all material related to that lab, unless an acceptable excuse is presented BEFORE the lab session via MIX.** It is the student's responsibility to contact the facilitator to setup a time for a make-up lab. Make-up labs will be handled on an individual basis at the facilitator's discretion.

**Tardiness:** Students arriving after the listed lab start time are solely responsible for obtaining the missed information. It is not the facilitator's responsibility to explain the material that was missed during the tardiness. However, if a student shows up over an hour late to lab they will not be permitted to conduct the lab experiment unless acceptable notification of tardiness was communicated prior to this date. If the course has any other items at the beginning of the lab that is missed (i.e. quiz), the student will receive a zero for said missed item.

**Lab Teams:** Students will be working in groups of 2, with the allowance of one group of 3 if odd number of students. Students must work with a **DIFFERENT** lab partner each week (i.e. you will never work with the same person more than once.) **Failure to do so will result in a zero (0) in any assignments related to that weeks lab.**

**Grading Algorithm:** Grades will be assigned on a standard scale:

≥ 90.00%	A
80.00-89.99%	B
70.00-79.99%	C
60.00-69.99%	D
< 60.00%	F

**Evaluation/Grading:**

Lab Performance	25%
Final Project	30%
Peer/Self Evaluation	15%
Portfolio	15%
Lab Station	15%

**Late Assignments:** Any assignment not submitted by the due date/time will receive an automatic 10% grade deduction per 24 hours. Please contact the facilitator BEFORE the due date if you need to discuss an exception to an assignment's due date. Note that absolutely no late assignments will be accepted for the Final Project. In addition, if a student submits their report via Turnitin but fails to ever turn in a hard copy, if instructed, the lab report will result in a zero grade.

**Lab Performance:** This is group-based document that would serve as your Results and Discussion part of an experiment report or publication. **The assignment is before the designated end time of the lab.** The format of this paper is up to you, but the following components should be included, if applicable:

- Design Schematics
- Simulation Results
- Actual Results
- One paragraph Discussion (Required)
  - The discussion section is where the results are reviewed as a whole in the context of the broader field and compared to initial predictions, objectives, or hypotheses along with indicating the implications of the work in the field, and suggesting possible follow-up works.

**Lab Station:** At the end of each experiment, the students are responsible for leaving the bench in a better state than what they arrived. At the end of each lab, the facilitator will check each bench and provide either a 1 or 0. Stations that are cleaned up, equipment off, and computers logged out will receive a 1. If the component area is left a mess, the whole class will receive a 0 for that lab. Below are some items that will result in a 0:

- Trash left
- Writing on tables
- Equipment left on
- Computer not properly off
- Cables left in disarray

Cleaning wipes are provided to wipe down the desks.

**Self/Peer Evaluation:** Within 72 hours, the students are asked to provide feedback on themselves along with their partners. On eCampus, a link will be provided to submit your evaluations of yourself and partner(s). This is used as a reflection of how your team performed and ways to improve. A rubric is provided on the link. Please keep in mind that no one person is perfect so please don't evaluate everyone with 100% and provide construct feedback. If students are abusing the system, the facilitator holds the right to deduct points from their evaluation grade.

**Portfolio:** At the end of the semester, all the work you have done throughout the laboratory experience needs to be compiled into a single PDF file with the following format. If this format is not followed, a zero will be given:

1. Table of Contents
  - a. 1-page summary covering: what was learned in lab? This is not a copy past of what was supposed to be learned in each individual lab but what was the overall learning of the lab.
  - b. Lab 1
    - i. Notes
    - ii. Results & Discussion
  - c. Lab 2
  - d. ...
  - e. Final Project
    - i. Design Notes
    - ii. Results & Discussion
    - iii. Presentation

**Document Submission:** Any report or digital document being said needs to follow a specific naming convention and document type. All documents must ALWAYS be turned in via Turnitin located on eCampus. This will be the official means to submit your lab report unless a hard copy is required to be turned in, which will depend on the facilitator. **If the facilitator requests a hard copy of the lab report, both the hard copy and the Turnitin copy must be submitted at the same time or the lab report will result in a zero grade.** If the following format and submission guidelines are not followed, a zero will be given:

- **ALL REPORTS NEED TO BE DEIDENTIFIED (i.e. no names, etc)**
- If the given format and submission guidelines are not followed, a zero will be given
- 12 point Times New Roman or Arial font
- Double-spaced
- Document Name and Date centered in the top header
- Document must be submitted as a **PDF**. Please check PDF for proper formatting
- Submission Title (for eCampus) Guidelines:
  - *If the document being submitted as a Team:*  
[Subj][Crse]. [Sec] .[SemesterCode].Lab[Lab #].Team[Station #]

*If the document being submitted as an Individual:*  
[Subj][Crse]. [Sec] .[SemesterCode].[Document Name]. [Last Four of ID]

Example:

- EE252.001.201808.LabPerformance5.Team8 is the name of Team 8's submission for Lab #5 in EE 252 during the Fall (08) semester of 2018.

**Extra Credit:** During the semester, there are usually extra credit opportunities that pop up. Please feel free to ask the TA what extra credit opportunities might exist. Students may propose extra credit but must receive written permission from the facilitator first. Below are some of the standard extra credit opportunities and their point value.

- Pass an [Amateur Radio License exam](#)
  - Technician: 2% added to final grade
  - General: 3% added to final grade
  - Extra: 5% added to final grade
- Split a resistor completely in half using one (1) benchtop power supply: 2% added to final grade
  - NOT a burn in half
- Design and write a new lab exercise : Up to 5% added to the final grade
- Submit proof of ESEI submission: 1% added to the final grade

#### **Weekly Student Checklist:**

1. Before Lab
  - a. Attend lecture
2. Day of Lab, Before
  - a. Grab lab kit
3. Day of Lab, During
  - a. Find **DIFFERENT partner** and introduce yourself
  - b. **Sign-In** to attendance sheet
  - c. Complete lab as a team
  - d. Submit the **Lab Performance**, following the given guidelines, before leaving the lab
  - e. Clean the lab bench
4. 72 Hours after the end of lab
  - a. Submit **Self/Peer Evaluations**

**The Role of the Lab Facilitator:** By now you have completed at least four EE/CpE labs and should be capable of using most of the laboratory instruments and taking good measurements. You should also be capable of doing the minimal technician work required for the lab exercises. You should also be capable of designing your own experiments to take most of the data required. You will not be given explicit directions except in a few cases where specific action is required or to mention pitfalls to be avoided.

Consequently, there will be very little lecture done in the lab. However, your lab facilitator will answer **specific** questions; often with another question to help you understand the situation rather than just give you something else to memorize. Please note that the lab facilitator will not troubleshoot your circuits for you but will help lead you through it. Instead, the facilitator will ask for a circuit diagram and ask you to take the measurements and what those measurements should be based on your design. Then the facilitator will work with you to develop a hypothesis of the trouble and follow through to verify.

**Academic Integrity:** The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, I will enforce rigorous standards of academic integrity in all aspects and assignments of this course. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the West Virginia University Academic Catalog at <http://catalog.wvu.edu/undergraduate/coursecredittermsclassification/#academicintegritytext>. Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see me before the assignment is due to discuss the matter.

**Adverse Weather Commitment:** In the event of inclement or threatening weather, everyone should use his or her best judgment regarding travel to and from campus. Safety should be the main concern. If you cannot get to class because of adverse weather conditions, you should contact me as soon as possible. Similarly, if I am unable to reach our class location, I will notify you of any cancellation or change as soon as possible, using eCampus to prevent you from embarking on any unnecessary travel. If you cannot get to class because of weather conditions, I will make allowances relative to required attendance policies, as well as any scheduled tests, quizzes, or other assessments.

**Inclusivity Statement:** The West Virginia University community is committed to creating and fostering a positive learning and working environment based on open communication, mutual respect, and inclusion. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with the [Office of Accessibility Services](#) (293-6700). For more information on West Virginia University's Diversity, Equity, and Inclusion initiatives, please see <http://diversity.wvu.edu>.

**Sexual Misconduct and Resources:** West Virginia University (WVU) does not tolerate sexual misconduct, including harassment, stalking, sexual assault, sexual exploitation, or relationship violence [BOG Policy 44]. It is important for you to know that there are resources available if you or someone you know needs assistance. You may speak to a member of university administration, faculty, or staff, but keep in mind that they have an obligation to report the incident to the Title IX Coordinator. If you want to speak to someone who is permitted to keep your disclosure confidential, please seek assistance from the Carruth Center, 304-293-9355 or 304-293-4431 (24-hour hotline), and locally within the community at the Rape and Domestic Violence Information Center (RDVIC), 304-292-5100 or 304-292-4431 (24-hour hotline). For more information please consult WVU policies at <http://titleix.wvu.edu>.

**Incomplete Grades:** Students who want be considered for an Incomplete must apply to their instructor prior to the end of the term. If the instructor agrees, the instructor and the student must negotiate the conditions under which the grade of I will be changed to a letter grade and sign a contract. The date to submit the incomplete work should not be set beyond the last day of class of the following semester. If the student does not complete the terms of contract, then the instructor should submit a grade of F. All incomplete contracts must be filed with the department and Dean's Office. See the policy at <http://catalog.wvu.edu/undergraduate/enrollmentandregistration/#gradestext>

**Sale of Course Materials:** All course materials, including lectures, class notes, quizzes, exams, handouts, presentations, and other materials provided to students for this course are protected intellectual property. As such, the unauthorized purchase or sale of these materials may result in disciplinary sanctions under the Campus Student Code.

**Student Evaluation of Instruction:** Effective teaching is a primary mission of West Virginia University. Student evaluation of instruction provides the university and the instructor with feedback about your experiences in the course for review and course improvement. Your participation in the evaluation of course instruction is both strongly encouraged and highly valued. Results are strictly confidential, anonymous, and not available to the instructor until after final grades are released by Admissions and Records. Information about how you can complete this evaluation will be provided later.