
ECE 320 Electronics I: Digital Electronics (week 1-10)

ECE 321 Electronics II: Analog Electronics (week 11-16)

Spring 2024 www.BisonAcademy.com

Course Information:

Instructor:	Ivan Lima
Class Times	Tu/Th 9:30am, Stevens 231 Fr 3:00pm, AGHill 228
Labs:	Part of homework sets Lab kits are provided for each student
Office Hours:	t.b.d.
Text:	Microelectronic Circuit Design by Richard Jaeger (\$7 used from Amazon)
On-Line Reference:	www.BisonAcademy.com www.electronics-tutorials.ws/index.html

Hy-Flex Model for Spring 2024

Students are welcome to take this course however they like:

- In-Person: Students are welcome to attend class at the designated class time and location.
- Live-Stream: Students are also welcome to live-stream the class. A link with how to connect will be sent out at the start of the semester on BlackBoard and to your NDSU email address.
- On-Line: Students are also welcome to take the class on-line and fit lectures into their own schedule.

Everyone is welcome to use the on-line resources as well. These include:

- Each day's lecture,
- Detailed lecture notes for each day,
- YouTube videos for each lecture,
- Daily handouts,
- YouTube discussions going over the handouts,
- Homework sets, and
- Solutions to previous homework sets (which are usually similar to this semester's homework)

It's completely your choice how you take the class.

Bulletin Description:

ECE 320: Characterization, modeling, and analysis of digital circuits using diodes, BJTs, FETs, and Op Amps. 4 one-hour lectures, 1 two-hour laboratory each week for 10 weeks. Prereq: EE 206. F, S

ECE 321: Characterization, modeling, and analysis of analog circuits using diodes, BJTs, FETs, and Op Amps. 4 one-hour lecture, 1 two-hour laboratory each week for 6 weeks. Prereq: EE 206. F, S

- ECE 320 is required for all electrical and computer engineers. Everyone should sign up for ECE 320.
- ECE 321 is required for all electrical engineers and is optional for computer engineers. It counts as a 2cr technical elective for computer engineers.

Course Objectives:

By the end of the semester, students should:

ECE 320 Electronics I

- Explain how current flows in a semiconductor via holes and electrons
- Explain how diodes and transistors operate
- Design and analyze diode circuits using nonlinear and ideal-diode models
- Design and analyze transistor circuits with binary outputs, and
- Design and analyze op-amp circuits with binary outputs

ECE 321 Electronics II

- Explain how to put a transistor into the active region
- Design and analyze transistor circuits with analog inputs and outputs,
- Design and analyze filters to meet design requirements, and
- Design and analyze op-amp circuits with analog inputs and outputs

Required Student Resources:

- Calculator capable of complex numbers
HP355 recommended (\$57 from Amazon)
Most ECE students use TI84 Plus (\$100 from Amazon)
- Ability to make videos and preferably post them on YouTube.
- MultiMeter capable of reading 1VAC (\$29 from Amazon.)
- Electronics Kits. (\$18 from Amazon)
- Extra parts (free - pick up in ECE 201)
- CircuitLab account (also free. Register at www.CircuitLab.com using your NDSU email address)

Evaluation Procedures and Grading Criteria

Grades will be the average of the following for Section 2 (online):

	Weekly Quizzes	Homework	Final Exam
ECE 320	33%	33%	33%
ECE 321	33%	33%	33%

Grades are rounded to the nearest 1%, with your final grade being

F	D	C	B	A
59% or less	60% - 69%	70% - 79%	80% - 89%	90% or more

Weekly Quizzes: Most weeks, there will be a quiz covering the previous week's homework.

- Students can take the quiz in person (six questions, answer in any order), or
- Remotely via BlackBoard (six questions, random order, no back tracking)

Remote quizzes will be made available any time between 8am to noon on the day of the quiz.

Homework & Labs: Each week, there will also be homework assignments coupled with lab exercises. Typically, the homework will consist of a few problems everyone does (such as design a circuit to push 20mA through an LED) as well as a problem you devise on your own to demonstrate your knowledge of that week's material. These latter problems should have the following sections:

- Requirements: What your circuit does. Inputs / Outputs / and how they relate
- Analysis: Math behind your design. Design a circuit to meet your requirements.
- Test: Check that your analysis was correct. Usually simulation results to verify currents, voltages, etc
- Validation: Build your circuit in the lab, collect data, and verify that you did or did not meet your requirements.

Note that lab reports are a part of the homework assignments: this is the actual data you collect to check your design. Separate lab reports are not required. Only one homework set per group is required.

All homework should be submitted electronically to Blackboard (preferred) or emailed to jacob_glower@yahoo.com

Final Exam: The final exam covers material from the previous quizzes

- The final exam for ECE 320 is Thursday, March 23rd
- The final exam for ECE 321 is 8:00am Tuesday, May 9th

Lab Time and Lab Access: Labs are to be done remotely (i.e. in your dorm room). The ECE department has purchased powered breadboard and the parts you'll need to do the labs for Electronics I and II. (free of charge to students in this class)

Labs are part of the homework sets (no separate write-up is required). A typical homework set will ask you to design a circuit using this week's components) (like a diode) with the following sections:

- Requirements: Specify what your circuit does. Inputs / Outputs / How they relate
- Analysis: Computations and circuit designs. Come up with a circuit which meets your design requirements.
- Test: Simulate your circuit in CircuitLab to check the voltages, waveforms, frequencies, etc.
- Validation: Build your circuit with the provided lab kit and verify the circuit works properly.

Note that to validate your circuit, you can measure with a multimeter (part of the \$30 soldering kit)

- The DC voltage,
- The AC voltage, and
- The frequency (download a piano tuner app on your cell phone)

The frequency is measured by connecting the output to an 8-Ohm speaker (part of your electronics kit)

Legal Stuff:

Special Needs - Any students with disabilities or other special needs, who need special accommodations in this course, are invited to share these concerns or requests with the instructor and contact the Disability Services Office (www.ndsu.edu/disabilityservices) as soon as possible.

Academic Honesty - The academic community is operated on the basis of honesty, integrity, and fair play. NDSU Policy 335: Code of Academic Responsibility and Conduct applies to cases in which cheating, plagiarism, or other academic misconduct have occurred in an instructional context. Students found guilty of academic misconduct are subject to penalties, up to and possibly including suspension and/or expulsion. Student academic misconduct records are maintained by the Office of Registration and Records. Informational resources about academic honesty for students and instructional staff members can be found at www.ndsu.edu/academichonesty.

Academic Honesty Defined: All written and oral presentations must “respect the intellectual rights of others. Statements lifted verbatim from publications must be cited as quotations. Ideas, summaries or paraphrased material, and other information taken from the literature must be properly referenced” (Guidelines for the Presentation of Disquisitions, NDSU Graduate School).

ECE Honor Code: On my honor I will not give nor receive unauthorized assistance in completing assignments and work submitted for review or assessment. Furthermore, I understand the requirements in the College of Engineering Honor System and accept the responsibility I have to complete all my work with complete integrity.

Veterans and Student Soldiers: Veterans and student soldiers with special circumstances or who are activated are encouraged to notify the instructor in advance.

Attendance: According to NDSU Policy 333 (www.ndsu.edu/fileadmin/policy/333.pdf), attendance in classes is expected. Students are responsible for the material covered in class and in assignments regardless of their attendance.