

ECE 322 – Electronics I

Catalog Description: Fundamental device characteristics including diodes, MOSFETs and bipolar transistors; small- and large-signal characteristics and design of linear circuits.

Credits: 4 **Terms Offered:** Winter

Prerequisites: ENGR 203

Courses that require this as a prerequisite: ECE 323, ECE 422, ECE 431, ECE 441, ECE 473, ECE 474, ECE 499 Sensors

Structure: Three 50-minute lectures per week plus one 3-hour lab per week

Instructors: Pallavi Dhagat (primary); Albrecht Jander (secondary)

Course Content:

- Introduction to electronics
- Diodes: small-signal model, applications
- BJTs: biasing, small-signal model
- BJT single-stage amplifiers: analysis and design
- BJT current mirrors
- MOSFETs: biasing, small-signal model
- MOSFET single-stage amplifiers: analysis and design
- MOSFET current mirrors
- Operational amplifiers
- Laboratory projects involve design and implementation of a regulated dual power supply. Students integrate the rectifier, filter, regulator and current limiting circuitry using diodes, bipolar junction transistors, field effect transistors, SPICE software, and basic Opamp circuits

Measurable Student Learning Outcomes:

At the completion of the course, students will be able to...

1. **Describe** the operation of diodes, BJTs and MOSFETs (ABET Outcomes: A, e, m)
2. **Explain** the concepts of large- and small-signal analyses (ABET Outcomes: A, e, m, n)
3. **Analyze and design** basic amplifier configurations (ABET Outcomes: A, C, e, m, q)
4. **Analyze and design** various Opamp configurations (ABET Outcomes: A, C, e, m, q)
5. **Use** basic commands in the circuit simulator SPICE for analysis of electronic circuits (ABET Outcomes: A, b, c, e, K, m)
6. **Design** a system to meet desired needs within realistic constraints and implement it (ABET Outcomes: A, B,C, E, I, K, m, O, Q)
7. **Work effectively** in professional teams utilizing appropriate communication skills (ABET Outcomes: D, G, p)

Learning Resources:

- *Microelectronic Circuits*, A. Sedra and K. C. Smith, Oxford University Press, Fourth Edition, 1998 (required).

- *SPICE for Microelectronic Circuits*, G. W. Roberts and A. Sedra, Oxford University Press, Second Edition, 1997 (optional).

Students with Disabilities:

Accommodations are collaborative efforts between students, faculty and Services for Students with Disabilities (SSD). Students with accommodations approved through SSD are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through SSD should contact SSD immediately at 737-4098.

Link to Statement of Expectations for Student Conduct:

<http://oregonstate.edu/admin/stucon/achon.htm>

Revised: 9/26/07