OFFICIAL COURSE OUTLINE INFORMATION

Students are advised to keep course outlines in personal files for future use.

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<th>FACULTY/DEPARTMENT:</th>
<th>PHYSICS 332</th>
<th>NATURAL SCIENCES</th>
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<tr>
<td>COURSE NAME/NUMBER</td>
<td>ELECTRONICS</td>
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COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

Physics 332 is an introductory electronic principles and circuit analysis course. This course will cover the following topics: analysis of DC and AC circuits, diodes, bipolar transistors, field effect transistors, transistor amplifiers, operational amplifiers, power supplies, and digital logic. Students enrolling in this course must also take in the same semester, Physics 342, the accompanying lab course. A major emphasis will be placed on using the provided computers to model the circuits and the circuit devices studied in this course. Access to a home, IBM compatible computer, will assist the student in doing many of the problems and experiments.

PREREQUISITES: Physics 222
COREQUISITES: PRE- or COREQUISITES Physics 342

SYNONYMOUS COURSE(S)
(a) Replaces: (Course #)
(b) Cannot take: (Course #)

SERVICE COURSE TO:

| TOTAL HOURS PER TERM: 60 |
| TRAINING DAY-BASED INSTRUCTION |
| STRUCTURE OF HOURS: |
| Lectures: 60 Hrs |
| Seminar: Hrs |
| Laboratory: Hrs |
| Field Experience: Hrs |
| Student Directed Learning: Hrs |
| Other (Specify): Hrs |

MAXIMUM ENROLLMENT: ___________
EXPECTED FREQUENCY OF COURSE OFFERINGS: ___________
WILL TRANSFER CREDIT BE REQUESTED? (lower-level courses only) ☑ Yes ☐ No
WILL TRANSFER CREDIT BE REQUESTED? (upper-level requested by department) ☐ Yes ☑ No
TRANSFER CREDIT EXISTS IN BCCAT TRANSFER GUIDE: ☑ Yes ☐ No

AUTHORIZATION SIGNATURES:
Course Designer(s): __________________ Chairperson: George McGuire (Curriculum Committee)
Department Head: __________________ Dean: Henry Speer J.D. Tunstall, Ph.D.
PAC Approval in Principle Date: ___________ PAC Final Approval Date: December 13, 2000

COURSE IMPLEMENTATION DATE: September 1993
COURSE REVISED IMPLEMENTATION DATE: September 2001
COURSE TO BE REVIEWED: (Four years after implementation date) September 2005

(MONTH YEAR)
LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

This course is designed to provide students with:
1. The theory needed to understand and predict how electronic devices will function when placed in circuits;
2. The theory to design and analyze the electronic circuits;
3. The ability to design, run, and test circuits on computer simulators;
4. An appreciation of the importance electronics plays in the lives of Canadians.

METHODS:

This course will be presented using lectures, demonstrations, and computer simulations. The use of the computer simulators will permit the students to design and check how their circuits should function when constructed in the lab. The computer simulations will help the students understand and master the electronic principles and circuit theory, as well as provide an appreciation of how important a computer can be to a physicist. Students after successfully completing this course will have a good understanding of basic electronic devices, how computers may be used to model and test electronic circuits (active and passive devices), and the ability to design, construct, and to test circuits.

PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

Credit can be awarded for this course through PLAR (Please check:)  Yes  No

METHODS OF OBTAINING PLAR:

TEXTBOOKS, REFERENCES, MATERIALS:

[Textbook selection varies by instructor. An example of texts for this course might be:]


REFERENCES:

SUPPLIES / MATERIALS:

STUDENT EVALUATION:

[An example of student evaluation for this course might be:]

Assignments  20%
Mid-term  20%
Computer Simulations  20%
Final  40%

COURSE CONTENT:

[Course content varies by instructor. An example of course content might be:]

Week 1: Semiconductors
  - Conductors and semiconductors
  - Doping a semiconductor
  - Diode curve: forward and reverse bias
  - Diode approximations
  - Diode circuits

Week 2: Bipolar Transistors
  - Unbiased and biased transistor (PNP NPN)
  - Collector curves
  - Transistor approximations
Week 3: Transistor Fundamentals
- load line, operating point, saturation points
- transistor switch
- LED drivers
- Transistor Biasing

Week 4: AC Models
- coupling and bypass capacitors
- small signal operation
- AC resistance of the emitter diode
- CE amplifier

Week 5: Voltage Amplifiers
- CE amplifier
- voltage gain
- analysis of voltage amplifiers
- power amplifiers (AC load line, Class A operation)

Week 6: Emitter follower
- CC amplifier
- voltage gain
- Class B operation

Week 7: Field Effect Transistors
- JFET
- drain curves
- JFET approximations
- MOSFET

Week 8: Op. Amps
- integrated circuits
- differential amplifier

Week 9: Op. Amps
- Op-amp characteristics
- small and large frequency operation
- negative feedback and inverting voltage feedback
- linear and non-linear op amp circuits

Week 10: Op Amps
- oscillators
- Schmitt triggers
- phase locked loops
- relaxation oscillations

Week 11: Op Amps
- voltage regulators

Week 12: Digital Logic
- the logic gates
- flip-flops

Week 13: Digital Logic
- registers and counters
- buffers

Week 14: Digital Logic
- digital to analog conversion/circuits
- analog to digital converter circuits