

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**



Sault College

**COURSE OUTLINE**

**COURSE TITLE:** ELECTRONIC CIRCUITS  
**CODE NO. :** ELN109 **SEMESTER:** TWO  
**PROGRAM:** ELECTRICAL/ELECTRONICS/INSTRUMENTATION  
**AUTHOR:** BILL ARMSTRONG  
**DATE:** JAN 2002 **PREVIOUS OUTLINE DATED:** JAN 2000  
**APPROVED:**

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**TOTAL CREDITS:** 5 **DEAN** **DATE**  
**PREREQUISITE(S):** ELN100  
**HOURS/WEEK:** 5

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*For additional information, please contact Kitty DeRosario, Dean*  
*School of Technology, Engineering & Technical Trades*  
*(705) 759-2554, Ext. 642*

**I. COURSE DESCRIPTION:**

This course is a detailed study of single stage, multi stage, voltage and power amplifiers employing BJTs, JFETs, MOSFETs and OPAMPs. This course will also include the study of various switching circuits and their applications. Hands on skills will be reinforced in the practical component of this course, which includes device testing, circuit assembly, testing and troubleshooting.

**II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:**

Upon successful completion of this course, the student will demonstrate the ability to:

1. Analyze, assemble, test and troubleshoot various BJT amplifier configurations

Potential Elements of the Performance:

- \* Perform a complete dc and ac analysis of multi-stage common-emitter amplifiers.
  - \* Test and troubleshoot multi-stage amplifiers to determine which amplifier stage is faulty.
  - \* Perform a complete dc and ac analysis of a Darlington emitter-follower amplifier.
  - \* Use Electronic Workbench to simulate and test a Darlington emitter-follower amplifier circuit.
  - \* Perform a complete ac analysis of a common-base amplifier.
  - \* Use Electronic Workbench to simulate and test a common-base amplifier circuit.
  - \* Describe and analyse the operation of class B and class AB power amplifiers.
  - \* Calculate compliance and maximum efficiency for various class A, class B, and class AB amplifiers.
  - \* Test and troubleshoot class B and class AB amplifiers.
2. Understand the characteristics, operation, biasing, and testing of JFETs and MOSFETs.
    - \* Identify the two types of JFETs and describe the construction and operation of each.
    - \* Plot transconductance curves to determine the range of “Q-POINT” values for different JFETs using specification sheets.
    - \* Describe and analyse the different types of JFET biasing circuits.
    - \* Perform a complete dc and ac analysis of JFET amplifiers
    - \* Assemble and test JFET amplifiers for correct dc and ac voltages.

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Potential Elements of the Performance Continued:

- \* Troubleshoot the circuit if measurements and calculations do not match and then you identify and correct the problem.
- \* Identify the two types of MOSFETs and describe the construction and operation of each.
- \* Describe and analyse the different types of MOSFET biasing circuits.
- \* Describe the purpose served by power MOSFET drivers.
- \* Assemble and test different MOSFET circuits.

3. . Understand the operation and characteristics of Operational Amplifiers (OPAMPS)

Potential Elements of the Performance:

- \* Describe the operational amplifier.
- \* Explain IC identification of an OPAMP.
- \* Explain the term differential amplifier.
- \* Describe the operation of a discrete differential amplifier.
- \* Using a specification sheet, list and understand the operating and electrical characteristics of OPAMPS.
- \* List common OPAMP faults and the symptoms of each.
- \* Understand frequency response of an OPAMP.
- \* Describe and analyse the operation of common OPAMP circuits.
- \* Assemble, test and troubleshoot if necessary common OPAMP circuits.

4. Understand common switching circuits and their applications

Potential Elements of the Performance:

- \* Describe and analyse the operation of the basic BJT, JFET AND MOSFET switches.
- \* Describe and analyse the operation of inverting and non-inverting Schmitt triggers.
- \* Describe the internal construction and operation of the 555 timer.
- \* Describe and analyse 555 timer astable and monostable multivibrators.
- \* Understand the operation of different types of relays.
- \* Understand the operation of different opto devices used in switching circuits.
- \* Describe and analyse the operation of a constant current generator.
- \* Assemble and test common switching circuits.
- \* Troubleshoot common switching circuits if so required.

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**III. TOPICS:**

1. BJT amplifiers
2. JFETs, MOSFETs and their applications
3. Operational amplifiers and their applications
4. Switching circuits and their applications

**IV. REQUIRED RESOURCES/TEXTS/MATERIALS:**

The final grade will be derived as follows:

Theory – Tests ( 3 or 4 ) and Quizzes	= 60%
Lab - Practical tests and reports	= 30%
Attendance and work ethics	<u>= 10%</u>
TOTAL	=100%

**V. EVALUATION PROCESS/GRADING SYSTEM:**

The following semester grades will be assigned to students in postsecondary courses:

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	90 - 100%	4.00
A	80 - 89%	3.75
B	70 - 79%	3.00
C	60 - 69%	2.00
R (Repeat)	59% or below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field placement or non-graded subject areas.	
U	Unsatisfactory achievement in field placement or non-graded subject areas.	
X	A temporary grade. This is used in limited situations with extenuating circumstances giving a student additional time to complete the requirements for a course (see <i>Policies &amp; Procedures Manual – Deferred Grades and Make-up</i> ).	

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Code No.**EVALUATION PROCESS/GRADING SYSTEM CONTINUED.....**

NR Grade not reported to Registrar's office. This is used to facilitate transcript preparation when, for extenuating circumstances, it has not been possible for the faculty member to report grades.

**VI. SPECIAL NOTES:**Special Needs:

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your instructor and/or the Special Needs office. Visit Room E1204 or call Extension 493, 717, or 491 so that support services can be arranged for you.

Retention of course outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Plagiarism:

Students should refer to the definition of "academic dishonesty" in *Student Rights and Responsibilities*. Students who engage in "academic dishonesty" will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Course outline amendments:

The Professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

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**VII. PRIOR LEARNING ASSESSMENT:**

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

**VIII. DIRECT CREDIT TRANSFERS:**

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.