

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**



**COURSE OUTLINE**

**COURSE TITLE:** Digital Electronics and Avionics

**CODE NO. :** ELN224 **SEMESTER:** 4

**PROGRAM:** Aviation Flight

**AUTHOR:** Juhani (John) Paloniemi

**DATE:** September 2013 **PREVIOUS OUTLINE DATED:** September 2012

**APPROVED:**

<i>“Corey Meunier”</i>	
CHAIR	DATE

**TOTAL CREDITS:** 3

**PREREQUISITE(S):** ELR104

**HOURS/WEEK:** 3

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*Technology & Skilled Trades*  
*(705) 759-2554, Ext. 2610*

**I. COURSE DESCRIPTION:**

This course is a study of modern analog and digital devices and circuits. The student will study electronic devices, digital numbering systems, Boolean algebra, common digital integrated circuits, as well as other pulse shaping / generating and switching circuits. Emphasis will be placed on the analysis and application of these devices and circuits in the Aviation Industry. Rounding out the course is an Avionics component covering the flight instruments and electronic circuits which produce, transmit and condition analog and digital signals including transmitting / receiving systems.

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

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

**1. *Understand the characteristics and operation of basic semiconductor devices ( Diode, Zener, LED, LCD and Light Detecting Diodes)***

Potential Elements of the Performance:

- Describe the operation of single PN junction devices
- Describe basic electrical characteristics of these devices

**2. *Understand the application of basic semiconductor devices (Diode, Zener, LED, LCD and Light Detecting Diodes)***

Potential Elements of the Performance:

- Describe the operation of various rectifiers.
- Describe the operation of Zener voltage regulators
- Calculate quantities associated with rectification / voltage regulation.

**3. *Understand the characteristics and operation of Bi-Polar Junction Transistors ( BJT's ).***

Potential Elements of the Performance:

- Describe the operation of PNP and NPN Transistors.
- Describe basic electrical characteristics of Transistors

**4. *Understand the application of Transistors in Switching and Amplifier Circuits.***

Potential Elements of the Performance:

- Describe the operation of a basic transistor switch circuit.
- Calculate quantities associated with the operation of a transistor switch.
- Describe the operation of a BJT Amplifier
- Calculate quantities associated with the operation of various Biasing Methods.

**5. *Understand the operation of basic Digital Integrated Circuit functions.***

Potential Elements of the Performance:

- Describe the difference between Analog and Digital
- Understand various Digital Numbering Systems, and be able to convert between Decimal, Binary, Octal, Hexadecimal and ASCII.
- Describe the operation of basic digital functions Algebraically (Boolean), with a Truth Table and Descriptively.

**6. *Understand the operation of basic RF Communication Circuits / Systems***

Potential Elements of the Performance:

- Understand the Radio Frequency Spectrum as prescribed by D.O.C. and F.C.C.
- Describe the theory / concepts of Radio Frequency communication ( Transmission / Reception )
- Describe basic RF modulation techniques ( AM / FM )
- Describe the principles of Antennas and RF Wave propagation.
- Describe the major components of an aircraft communication system.

**III. TOPICS:**

1. Electronic Semiconductor Devices and Applications
2. Digital Electronics
3. Avionics and RF Communication Systems
4. Other Devices and Transducers \*\* (as time permits)

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

Textbook used in ELR104, will serve as a reference,  
 Electronics: A Complete Course; 2nd ed.; by Nigel P. Cook; Prentice Hall;  
 ISBN: 0-13-111066-7,

Handouts will be supplied by the Instructor.

Students will be expected to use Internet Resources & D2L as indicated.

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

Final grade will be awarded based on the composite score of quizzes, and tests as follows:

Three Tests	75%
Attendance	5%
<u>Assignments /Quizzes</u>	<u>20%</u>
Total	100%

(The percentages shown above may have to be adjusted to accurately evaluate student skills. Students will be notified of any changes made.)

The professor reserves the right to adjust the mark up or down 5% based on attendance, participation, leadership, creativity and whether there is an improving trend.

NOTES: If a student misses a test or surprise quiz without contacting the instructor, the Dean's office or the switchboard prior to the test or quiz, a mark of zero will be assigned with no option for a re-write.

A minimum of 80% attendance is required in the lectures.

- Makeup Tests are at the discretion of the instructor and will be assigned a maximum grade of 50%.
- The professor reserves the right to adjust the number of tests, practical tests and quizzes based on unforeseen circumstances. The students will be given sufficient notice to any changes and the reasons thereof.
- A student who is absent 3 or more times without a valid reason or effort to resolve the problem will result in action taken.  
NOTE: If action is to be taken, it will range from marks being deducted to a maximum of removal from the course.

The following semester grades will be assigned to students:

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	90 – 100%	4.00
A	80 – 89%	3.00
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 – 59%	1.00
F (Fail)	49% and below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	

S	Satisfactory achievement in field /clinical placement or non-graded subject area.
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.
NR	Grade not reported to Registrar's office.
W	Student has withdrawn from the course without academic penalty.

## VI. SPECIAL NOTES:

### Electronic Devices in the Classroom:

Electronic recording devices will not be allowed in the classroom, with the exception of devices required because of a disability. the instructor must be notified in such cases.

Where the use of an electronic device has been approved, the student is required to return all copies of recorded material to the faculty member by the last day of class in the semester. The student further agrees that materials recorded are for his/her use only, are not for distribution, and are the sole property of the College.

### Attendance:

Sault College is committed to student success. There is a direct correlation between academic performance and class attendance; therefore, for the benefit of all its constituents, all students are encouraged to attend all of their scheduled learning and evaluation sessions. This implies arriving on time and remaining for the duration of the scheduled session.

***It is the departmental policy that once the classroom door has been closed on the half-hour, the learning process has begun. Late arrivals will not be granted admission to the room.***

**NOTE:**

- Your attendance and attention in all classes, and your final grade are directly related. A deduction of 1% per theory hour missed will be imposed. (including double periods)
- Any student that is absent for a test, will be required to provide a doctors' note immediately upon returning. Failing to do so will result in a grade of 0% being assigned to the missed test.
- There will be no rewrites for any test written.
- Tests, quizzes and other activities will not be scheduled on an individual basis, unless it is for a medical or family emergency.
- Disruptions to theory classes, such as lateness, are not acceptable and will be dealt with on an individual basis.

**All required submissions must be typed or neatly printed. Poor legibility will result in marks being deducted at the discretion of the instructor.**

All required submissions will be assessed a late penalty of **5% per day** (Weekends included, submit to Security at 2712).

**VII. COURSE OUTLINE ADDENDUM:**

The provisions contained in the addendum located on the portal form part of this course outline.