SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

Sault College

COURSE OUTLINE

COURSE TITLE: Digital Electronics & Avionics

CODE NO. : ELN -2240 **SEMESTER:** Four

PROGRAM: Aviation Flight

AUTHOR: Alan Gooderham

DATE: 06 / 2002 **PREVIOUS OUTLINE DATED:**

APPROVED:

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DEAN **DATE**

TOTAL CREDITS: 3

PREREQUISITE(S): ELR-104

HOURS/WEEK: 3

I. COURSE DESCRIPTION:

After a brief review of basic theory, the student will study terminology and applications involving aircraft electrical distribution systems and controls. The student will then study Digital Numbering Systems, Boolean Algebra, common Digital Integrated Circuits, as well as other pulse shaping / generating circuits. Emphasis will be placed on the analysis and troubleshooting of these devices and circuits, not component-level analysis. Rounding out the course is an application component covering the flight instruments and electronics which produce, transmit and condition analog and digital signals.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. Review terminology and characteristics associated with basic DC circuits, Ohm's & Kirchoff's laws, and applications to aircraft electrical systems.

   Potential Elements of the Performance:

   - Identify and Define Ohm's law, series and parallel circuits.
   - Identify components, relationships and situational analysis using synoptic readout examples from pilot reference manuals.

2. Understand AC terminology and digital numbering systems.

   Potential Elements of the Performance:
   - Identify and Define Pulse Amplitude, Period, Pulse Width, Pulse Space, Duty Cycle, Rise / Fall Times, Overshoot / Undershoot and Ringing of AC rectangular wave-shapes.
   - Fluently count in Binary, Octal, Hexadecimal, Binary Coded Decimal up to 100_{10}.
   - Convert between Decimal and Binary, Octal, Hexadecimal, Binary Coded Decimal.
   - Understand the Gray and ASCII codes.

3. Understand and troubleshoot circuits employing TTL & CMOS Logic Gates

Potential Elements of the Performance:

- Produce basic operational analysis of individual logic gates.
- Analyse and troubleshoot theoretical circuits employing digital logic functions.

4. Understand Pulse Generating and Wave-shaping Circuits.

   Potential Elements of the Performance:
   - Answer analytical questions involving circuits used in the generation of non-sinusoidal waveforms utilizing the 555 Timer, Integrators, Differentiators and Schmitt Triggers.

5. Understand Electronic Flight Instrument System (EFIS) signal production and comparison
   Potential Elements of the Performance:
   - Identify Primary Flight Display (PFD) components and operation.
   - Identify component operations within an EFIS system which produce the comparator signals and error message to the PFD's.
   - Interpret Flight Control System indications and warnings .

III. TOPICS:

1. Ohm's & Kirchoff's Laws, definitions, DC series and parallel circuits and aircraft electrical systems

2. AC Terminology (Rectangular / Pulse Waveshapes) & Digital Numbering

3. TTL & CMOS Logic Devices and Circuits

4. Pulse & Waveshaping Circuits

5. Electronic Flight Instrument System (EFIS)

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

- Text - Digital Systems Principles and Applications by Tocci & Widmer (8th Edition) **Note:** 7th Edition will suffice.

V. EVALUATION PROCESS/GRADING SYSTEM:

The final grade will be a combination of theory tests, surprise quizzes (5% max) and assignments.

84% = Theory (Consisting of 3 tests @ 28% each)
16% = Assignments and quizzes

- **See Special Notes Section for further details affecting final grade.**

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

Grade	Definition	Grade Point Equivalent
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 *Policies & Procedures Manual – Deferred Grades and Make-up*).	
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.

- A ***deduction of 2% per class hour missed***, will be imposed on the final mark.
- Any student that is absent for a test, must contact the professor in advance (voice-mail, e-mail, Dean's office, switchboard) and will be required to provide a doctors' note immediately upon returning. Failing to do so will result in a grade of 0% being assigned for the missed test.
- 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 assigned reports must be submitted in a Duo-Tang cover.

All required submissions will be assessed a late penalty of ***5% per day*** (Weekends included).

Theory Tests will not be returned. Students will be given the opportunity to review / correct the test material.

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.