

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY  
SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: INDUSTRIAL ELECTRONICS  
Code No.: ELN 213  
Program: ELECTRICAL/ELECTRONIC/COMPUTER TECHNOLOGY  
Semester: THREE  
Date: JUNE, 1984  
Author: W. FILIPOWICH

New: \_\_\_\_\_ Revision: X

APPROVED:

*J.P. Proietto* \_\_\_\_\_  
Chairperson Date

INDUSTRIAL ELECTRONICS  
Course Name

ELN 213  
Course Number

PHILOSOPHY/GOALS:

This course will provide the student with a study of various circuits used in the generation and shaping of non-sinusoidal waveforms including sweep-generating circuits. Also, an understanding of switching, trigger and control devices will be covered; including optoelectronics, operational amplifiers, unijunction transistors, timers and thyristor devices; their characteristics and industrial applications.

METHOD OF ASSESSMENT (GRADING METHOD):

Assessments will consist of four major tests and various quizzes for 60% of the overall mark.

Practical tests, lab quizzes, logbook, oral and written assignments, and general lab assessment will make up the other 40%.

TEXTBOOK(S):

Fundamentals of Pulse & Digital Circuits - Tocci

REFERENCE TEXT:

Industrial Solid-State Electronics - Maloney

PART "A" - PULSE CIRCUITS

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BLOCKS	THEORY/LAB PERIODS	TOPIC DESCRIPTION	REFERENCE CHAPTERS
I	7 - 4	Pulse Waveform Analysis RC Circuits	1, 2 3
II	6 - 4	Switching Devices Signal Conditioning Circuits	4 6
III	8 - 6	Pulse Generating Circuits Tektronix Oscilloscope Model	11 11

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PART "B" - ELECTRONIC CONTROLS

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BLOCKS	THEORY/LAB PERIODS	TOPIC DESCRIPTION	REFERENCE CHAPTERS
I	6 - 4	Optoelectronic Devices	
II	3 - 2	Operational Amplifiers	
III	3 - 2	Trigger and Timing Devices	
IV	9 - 6	PNPN (Thyristor) Control Devices	

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OBJECTIVES

PART "A" - PULSE CIRCUITS

<u>BLOCK I:</u>	<u>THEORY PERIODS</u>
Introduction - Ideal pulse signals - Ideal switching devices	2
Pulse Waveform Analysis - Pulse distortion - Periodic pulse waveforms - Harmonic content of periodic waveforms - Non-periodic pulse	2
RC Circuits - The exponential form - RC low-pass circuits - RC high-pass circuits - RC circuit response to periodic inputs	3
<u>BLOCK II:</u>	
Switching Devices - The diode as a switch - The BJT as a switch - Field effect transistor switches	2
Signal Conditioning Circuits - Diode clippers - Operational amplifier clipper - Transistor inverter - Buffer circuits - Differential comparator - The schmitt trigger	4
<u>BLOCK III:</u>	
Pulse Generating Circuits - Unijunction oscillator circuit - Programmable UJT (PUT) - Schmitt trigger oscillators - One shot circuits connected as an oscillator - Oscillators made from inverters	3
Sweep Generation - Sweep-voltage waveform - Transistor sweep generator - Free running sweep generator - Oscilloscope circuits	4
Oscilloscope - Model	1

PART "B" - ELECTRONIC CONTROLS

BLOCK I: - Optoelectronics (6 - 4)

1. Fundamentals of Light
2. Photoelectric Devices
  - photoconductors
  - photovoltaic cells
3. Photoconductive Sensors
  - photodiode
  - photo transistor
4. Light Emitters
  - LED's, LCD's
5. Photocouplers
6. Fibre Optics
7. Application of Optoelectronic Devices

BLOCK II: - Operational Amplifiers (3 - 2)

1. Symbol and Operation
2. Amplifiers
3. Comparators
4. Converters (voltage/current)
5. Applications

BLOCK III: - Trigger and Timing Devices (3 - 2)

1. Operation, characteristics, specifications and applications
  - Unijunction Transistor (UJT)
  - Four-Layer Diode
  - Diac
2. UJT Relaxation Oscillator
3. The 555 Timer
  - operation and application
4. Other Switching Devices
  - SVS, SBS

BLOCK IV: - PNPN (Thyristor) Control Devices (9 - 6)

1. Latching Devices
2. Silicon Controlled Rectifier (SCR)
  - theory and operation
  - characteristics
  - applications
3. TRIACS
  - theory, operation, characteristics and applications
4. Other PNP Devices
  - LASCR, GCS, SCS
5. Applications