1/21/2025 DATE
☑ REQUIRED COURSE
☐ ELECTIVE COURSE

TEC DIVISION
☐ NEW COURSE
☑ REVISION

Lake Land College
Course Information Form

COURSE NUMBER:	APT-051	TITLE: *(30 Characters Max)*		Solid State Devices & Apps		

SEM CR HRS:	4	Lecture:	2	Lab:	4		ECH:	6

Course Level:	☐ Gen Ed / IAI ☐ Baccalaureate /Non-IAI	☑ Career/Technical ☐ Dev Ed/ Not in Degree Audit	Clinical Practicum:	0	Work-based Learning:	0	WBL ECH:	0

Course PCS & CIP:	12 - 15.0303	IAI Code		N/A		Contact Hours (Minutes/Week)		
Repeatable (Y/N):	N	Pass/Fail (Y/N):	N	Variable Credit (Y/N):	N	Min:	Max:	16 Wks 300 / 8 Wks 600

Prerequisites:	None
Corequisites:	None
Catalog Description: (40 Word Limit)	Study of basic solid state devices, circuits and systems. Topics include: rectifiers, transistors, switching circuits, linear amplifiers, timers and variable frequency drives (VFD). Emphasis on oscilloscope and digital multi-meter use.

List the Major Course Segments (Units)	Contact Lecture Hours	Contact Lab Hours	Clinical Practicum	Work-based Learning
RLC networks and filter circuits	7	16		
Intro to semiconductors and power supplies	8	12		
Transistors and amplifiers	8	9		
MOSFET and SCR motor controls	2	3		
Operational amplifiers and 555 timers	3	8		
Project design	1	9		
Variable frequency drives	1	3		
TOTAL	30	60	0	0

EVALUATION

QUIZZES ☑	EXAMS ☑	ORAL PRES ☐	PAPERS ☐
LAB WORK ☑	PROJECTS ☑	COMP FINAL ☑	OTHER ☐

COURSE MATERIALS

TITLE:	Electricity & Electronics
AUTHOR:	Howard Gerrish, William Dugger & Richards Roberts
PUBLISHER:	Goodheart Willcox
VOLUME/EDITION/URL:	11th edition
COPYRIGHT DATE:	2021

TITLE:	Electricity & Electronics Lab Workbook
AUTHOR:	Gerrish, Dugger Jr., Roberts
PUBLISHER:	Goodheart Willcox
VOLUME/EDITION/URL:	11th edition
COPYRIGHT DATE:	

MAJOR COURSE SEGMENT	HOURS	LEARNING OUTCOMES
		The student will be able to:
RLC networks and filter circuits	23	1. Explain resonant frequency and how it affects various RCL circuits. 2. Calculate a resonant frequency. 3. Discuss the characteristics of a series RCL circuit at its resonant frequency. 4. Discuss the characteristics of a parallel RCL circuit at its resonant frequency. 5. Calculate circuit Q and bandwidth. 6. Describe filtering action. 7. List four types of filters and explain their action.

Intro to semiconductors and power supplies	20	1. Explain the doping process. 2. Explain how N-type and P-type materials are made. 3. Discuss how N-type and P-type materials conduct electrical energy. 4. Explain forward and reverse biasing. 5. Discuss various types of semiconductor diodes. 6. Explain the operation of a half-wave and full-wave rectifier. 7. Explain power supply filtering. 8. Explain power supply load characteristics. 9. Outline various methods for regulating voltage. 10. Discuss methods for raising voltages. 11. Construct simple power supplies.
Transistors and amplifiers	17	1. Explain the operation of the bipolar transistor. 2. Explain the operation of field-effect transistors. 3. Discuss different biasing techniques. 4. Identify various transistor circuit configurations. 5. List the components of amplifier circuits and give the function for each component. 6. Explain amplifier operation. 7. Compute the gain of amplifier circuits. 8. Perform dc load line analysis on a transistor circuit. 9. Discuss the advantages and disadvantages of various methods of amplifier coupling.
MOSFET and SCR motor controls	5	1. Define a MOSFET and the two modes of operation. 2. Define a SCR and how it can be used for dc motor control applications.
Operational amplifiers and 555 timers	11	1. Define integrated circuit (IC). 2. Explain a brief history of the IC. 3. Discuss the construction of an IC. 4. Illustrate the steps in construction of an IC. 5. Explain the operation of the operational amplifier. 6. Explain the operation of the 555 timer.
Project design	10	1. Design and build a temperature control variable speed dc motor controller.
Variable frequency drives	4	1. Define a variable frequency drive (VFD). 2. Explain the operation of the VFD. 3. Program and test VFD in operation.
	90	

Outcomes*	At the successful completion of this course, students will be able to:
Course Outcome 1	Explain the four types of filters and their actions.
Course Outcome 2	Predict amplifier operation.
Course Outcome 3	Demonstrate forward and reverse biasing.
Course Outcome 4	Explain the operation of a variable frequency drive.
Course Outcome 5	Construct a basic timing circuit.
Primary Laker Learning Competency	Critical Thinking: Students connect knowledge from various disciplines to formulate logical conclusions and judgments.
Secondary Laker Learning Competency	Quantitative Literacy: Students utilize mathematical knowledge to test claims and hypotheses, perform data analysis and recognize patterns in real-life situations.

Course and program outcomes will be used in the software for outcomes assessment and should include at least 1 primary and 1 secondary Laker Learning Competency. Limit to 3-5.