

**College of Micronesia – FSM  
P.O. Box 159  
Kolonia, Pohnpei**

**Course Outline Cover Page**

**Discrete Devices II**  
Course Title

**VEE 222**  
Department and Number

**Course Description:** This course covers the construction and operation of various discrete thyristor power control devices such as Diacs, Triacs, SCRs, PUTs and UJT's and their circuit configurations.

**Prepared by:** Brent Villiers

**State:** National Campus

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3/6	16/8	48	3
Laboratory				
		Total Semester Credits:		3

<b>Purpose of Course</b>	Degree Requirement	_____
	Degree Elective	_____
	Advanced Certificate	XX _____
	Certificate	_____
	Remedial	_____
	Other (Workshop)	_____

**Prerequisite Course(s):** VEE 110 Discrete Devices I

\_\_\_\_\_  
**Signature, Chairman, Curriculum Committee**

\_\_\_\_\_  
**Date Approved by Committee**

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**Signature, President, COM-FSM**

\_\_\_\_\_  
**Date Approved by the President**

**General Objective:**

This course will introduce students to the thyristor power control family of semiconductor devices and other power control and triggering devices. The student will describe the construction and operation of various devices as well as observe their operation.

**Learning Outcomes:**

Upon successful completion of this course the student will be able to:

1. Describe the purpose and operating characteristics of UJTs and SCRs.
2. Describe UJT oscillator operation.
3. Describe SCR trigger circuit operation.
4. Describe SCR power control operation.
5. Perform SCR circuit troubleshooting.
6. Describe the relationship between Triacs and SCRs, and Diacs and Four-layer devices. Observe the effect of DC and AC voltages on Triac operation.
7. Describe the construction, operation and applications of PUT devices.

***STUDENTS SHOULD BE MADE AWARE OF OCCUPATIONAL HEALTH AND SAFETY ISSUES IN ALL SITUATIONS AND BE EXPECTED TO DEMONSTRATE SAFE WORKING PRACTICES AT ALL TIMES.***

**Outline of Content:**

- This course contains:
1. Unijunction Transistor
    - Purpose, schematic and operating characteristics
    - UJT Oscillator.
  2. Silicon Controlled Rectifier
    - The construction, schematic and operation of SCRs
    - SCR trigger Circuits.
    - SCR power control circuits.
    - SCR troubleshooting.
  3. Triacs, Diacs and Four-layer devices

- Comparison of operation between the devices.
  - Effect of Ac and DC voltages on Triac operation.
4. Programmable Unijunction Transistor
- Construction, operation and applications.

**Learning Outcomes:** On completion of this course the learner will be able to:

**Learning Outcome 1**      **Describe the purpose and operating characteristics of UJTs and SCRs.**

Assessment Criteria

- a. Describe the purpose of UJTs.
- b. Identify unijunction transistor schematic symbols.
- c. Describe the operating characteristics of unijunction transistors.
- d. Describe the purpose of silicon controlled rectifiers.
- e. Identify silicon controlled rectifier schematic symbols.
- f. Describe silicon controlled rectifier operating characteristics.

Assessment Method      Multiple choice questions  
Short answer questions

**Learning Outcome 2**      **Describe UJT oscillator operation.**

Assessment Criteria

- a. Describe the purpose of UJT oscillators.
- b. Recognize UJT oscillator and describe their operation.
- c. Recognize normal operation of a UJT oscillator circuit and measure their waveforms.

Assessment Method      Multiple choice questions  
Short answer questions  
Practical exercises/tests

**Learning Outcome 3**      **Describe SCR trigger circuit operation.**

Assessment Criteria

- a. Describe the purpose of SCR trigger circuits.
- b. Recognize SCR trigger circuits.
- c. Describe the operation of a SCR trigger circuit.
- d. Measure gate and anode current in an operating SCR circuit.
- e. Recognize normal operation of a SCR trigger circuit.

Assessment Method      Multiple choice questions

Short answer questions  
Practical exercises/tests

**Learning Outcome 4****Describe SCR power control operation.**

Assessment Criteria

- a. Describe the purpose of SCR power control circuits.
- b. Recognize SCR power control circuits.
- c. Describe the operation of a SCR power control circuit.
- d. Recognize normal operation of a SCR power control circuit.
- e. Measure the waveforms in an operating SCR power control circuit.

Assessment Method

Multiple choice questions  
Short answer questions  
Practical exercises/tests

**Learning Outcome 5****Perform SCR circuit troubleshooting.**

Assessment Criteria

- a. Identify the faulted component in an SCR trigger circuit
- b. Identify the faulted component in an SCR power control circuit.

Assessment Method

Multiple choice questions  
Short answer questions  
Practical exercises/tests

**Learning Outcome 6****Describe the relationship between Triacs and SCRs, and Diacs and Four-layer devices. Observe the effect of DC and AC voltages on Triac operation.**

Assessment Criteria

- a. Describe the relationship between Triacs and SCRs.
- b. Recognize Triac circuit operation based on input conditions.
- c. Describe the relationship between Diacs and Four-layer Diodes.
- d. Explain the advantage of using a Diac with a Triac.
- e. Observe the effect of AC voltages with basic Triac operation.
- f. Observe the effect of DC voltages with basic Triac operation.
- g. Describe the effects of triggering a Triac with an AC waveform.

Assessment Method	Multiple choice questions Short answer questions Practical exercises/tests
<b>Learning Outcome 7</b>	<b>Describe the construction, operation and applications of PUT devices.</b>
Assessment Criteria	a. Recognize the PUT schematic symbol. b. Describe the construction of PUT devices. c. Describe the operation of PUT devices. d. Identify PUT device applications.
Assessment Method	Multiple choice questions Short answer questions

**Required Course Materials:****1. Instructor:**

- a. CAI Classroom with whiteboard or chalkboard
- b. Laboratory equipment with tools of the trade
- c. Text, Teacher's Resource Guide, workbook
- d. Overhead projector, transparencies

**2. Student:**

- a. Text(s), handouts provided by instructor
- b. Ring binder
- c. College ruled note sheet, pencil or pen
- d. Scientific calculator

**Reference Materials:**

Electronic Devices, *Fourth Edition*  
Thomas L. Floyd, 2002

**Method of Instruction:**

1. Computer Aided Instruction
2. Practical/Experimentation
3. Lecture/Demonstration

**Evaluation:**

Final Grade for this course will be based on meeting the course requirements at the following percentage rates:

90% - 100%	A – Superior
80% - 89%	B – Above Average
70% - 79%	C – Average
60% - 69%	D – Below Average
0 % - 59%	F – Failure

**Attendance:**

The COM-FSM attendance policy will apply