Wharton County Junior College

Administrative - Master Syllabus
COVER SHEET

***Purpose**: It is the intention of this Administrative-Master Syllabus to provide a general description of the course, outline the required elements of the course and to lay the foundation for course assessment for the improvement of student learning, as specified by the faculty of Wharton County Junior College, regardless of who teaches the course, the timeframe by which it is instructed, or the instructional method by which the course is delivered. It is not intended to restrict the manner by which an individual faculty member teaches the course but to be an administrative tool to aid in the improvement of instruction.*

Course Title - Digital Systems
Course Prefix and Number - CETT 1449
Department – Electronics Eng. Tech. **Division -** Technology and Business
Course Type: (check one)

☐ Academic General Education Course (from ACGM – but not in WCJC Core)
☐ Academic WCJC Core Course
☒ WECM course (This course is a Special Topics or Unique Needs Course: Y☐ or N☒)

Semester Credit Hours # : Lecture hours # : Lab/Other Hours # **4:3:3**

Equated Pay hours for course – 4.5

List Lab/ Other Hours
Lab Hours 3
Clinical Hours
Practicum Hours
Other (list)

Course Catalog Description - A course in electronics covering digital systems. Emphasis on application and troubleshooting digital systems using counters, registers, code converters, multiplexers, analog-to-digital to-analog circuits, large-scale integrated circuits, and PLDs. Logic family characteristics: TTL, ECL, and CMOS. I/O techniques and devices, A/D, D/A conversion, and display methods.

Prerequisites/Co Requisites - Credit for CETT1425

Prepared by David Kucera ***Date*** 05/12/13

Reviewed by Department Head David Kucera ***Date*** 06/10/13

Accuracy verified by Division Chair David Kucera ***Date*** 06/10/13

Approved by Dean or Vice President of Instruction Amy LaPan ***Date***1/30/2014

I. Topical Outline – Each offering of this course must include the following topics (be sure to include information regarding lab, practicum, clinical or other non-lecture instruction):

The following performance will be expected of any student completing this course with a passing grade. There is no absolute time limit on the performance of these objectives, unless noted, but the grade received by the student will depend, in part, on the relative speed and precision of the student's performance in these tasks. Where subjective evaluations are indicated, the instructor will make these judgments based on his or her knowledge of the skills required to place a graduate with the expectation of successful on-job performance.

The student will be expected to perform the following tasks in written examination or laboratory demonstration:

*Define, give examples of, and clearly differentiate between "digital" and "analog" systems.

*Define the nature of digital signals, and identify digital numbers in serial and parallel form.

*Describe the functioning of TTL, MOS, and CMOS inverters, when given the appropriate circuit diagram.

*Write the Boolean equation for combinational networks of 15 gate complexity.

*Simplify using Boolean Algebra an expression of not over five terms in three variables.

*Simplify using Karnough Mapping a Boolean expression in three variables of five terms.

*Convert to NAND realization an AND-OR Boolean expression in three variables of five terms.

*Design, construct, and operate a combinational system using TTL or CMOS integrated logic when given a stated problem in logic not involving more than three variables and five terms.

*Draw the logic symbol and truth table of a S-R flip flop; show the NAND and NOR implementation of a S-R FF: describe the output states for the S-R FF when given a timing diagram showing the input states.

*Draw the logic symbol and truth table for the S-R Master-Slave FF; show the NAND and NOR implementation of the S-R Master-Slave FF; explain the necessity for the Master-Slave design; describe output states when given an input timing diagram.

*Draw the logic symbol and truth table of the J-K flip- flop; describe the output states when given a timing diagram showing the inputs.

*Define and give examples of multiplexers and demultiplexers.

*Demonstrate understanding of the operation and uses of the tri-state output configuration.

*Explain the operation of the One-Shot (Monostable Multivibrator) and correctly connect to demonstrate action.

*Design and construct asynchronous binary counters.

*Design and construct asynchronous counters of any modulus.

*Design and construct synchronous binary counters.

*Design and construct a synchronous decade counter.

*Draw a block diagram of an asynchronous Time-of-Day clock.

*Demonstrate understanding of the concept of frequency division.

*Draw the timing diagram for serial-in/parallel out registers, given an arbitrary input.

*Draw the timing diagram for SS, PP, SP, and PS shift-registers, given an arbitrary input.

*Design and implement in TTL or CMOS an eight bit serial-in parallel-out shift register using J-K FF's as storage elements.

*Design and implement in TTL or CMOS an eight bit parallel-in serial-out shift register using D FF's.

*Demonstrate understanding of the IEEE symbols for registers.

*Select RAM, ROM, EPROM, EEPROM, PROM as appropriate for a given application.

*List the types of memory in use for digital storage, and discuss relative merits of each (core, semiconductor, disk, tape).

*Define ROM, RAM, PROM, EPROM, access time, cycle time, volatile, hysteresis, static, dynamic, refresh.

*Discuss the operation of PLA's and their importance in modern digital circuits.

II. Course Learning Outcomes

Course Learning Outcome **Upon successful completion of this course, students will:**	Methods of Assessment **Outcomes 1,2,3 will be assessed by:**
1.Analyze and troubleshoot digital systems 2.Evaluate the operation of digital systems while operating in normal and fault mode using various test instruments; 3.Draw a simple block diagram of a digital computer system.	• Exams • Homework • Labs • Quizzes • Reassessed in Capstone Experience: CETT 2349 Final Project course

III. Required Text(s), Optional Text(s) and/or Materials to be Supplied by Student.

An appropriate electronics text covering Digital Circuits. Example-Digital Systems principles and applications by Tocci, Widmer, and Moss 11th edition.

Calculator – scientific with Sine, Cosine, Tangent capabilities..

IV. Suggested Course Maximum - 30 lecture, 15 laboratory

V. List any specific spatial or physical requirements beyond a typical classroom required to teach the course.

Lecture facilities for 30 students. Laboratory facilities for 18 students must include 9 bench positions each with a digital meter, logic probe, 20 MHz oscilloscope and probes, bread boarding facility with power supply and signal generator, and a stock of basic AC circuit components.

VI. Course Requirements/Grading System – Describe any course specific requirements such as research papers or reading assignments and the generalized grading format for the course

Evaluation of Performance:
Course grades will be determined by the percentage of course objectives for which the student can demonstrate mastery and by attendance as stated in the Departmental Policy sheet provided to the student. Mastery of course objectives will be determined by written examinations, an attendance grade as described in the Departmental Policy handout, a daily work grade which will include graded homework, graded laboratory work, and a comprehensive final exam.
Approximate Grade Evaluation Summary:

Major tests 60%
Attendance.....10%
Lab reports, homework, and quizzes. 15%
Comprehensive Final examination 15%

Grade Scale:

90 to 100: A
80 to 89: B
70 to 79: C
60 to 69: D
0 to 59: F

VII. Curriculum Checklist

☐ - **Academic General Education Course** (from ACGM – but not in WCJC Core)
No additional documentation needed

☐ - **Academic WCJC Core Course**
Attach the Core Curriculum Checklist, including the following:
- Basic Intellectual Competencies
- Perspectives
- Exemplary Educational Objectives

☒ - **WECM Courses**
If needed, revise the Program SCANS Matrix & Competencies Checklist.