McLennan

COMMUNITY

COLLEGE

WACO, TEXAS

COURSE SYLLABUS

AND

INSTRUCTOR PLAN

Introduction to Digital Systems

ENGR - 2406 - 01

Professor Laura E. Wright

Course Description:
Introduction to theory and design of digital logic, circuits, and systems. Number systems, operations and codes, logic gates, Boolean Algebra and logic simplification, Karnaugh maps, combinational logic, functions of combinational logic, flip-flops and related devices, counters, shift registers, sequential logic, memory and storage.

Prerequisites and/or Corequisites:
MATH 1314 with a grade of C or better.

Instructor Information:
Instructor Name: Professor Laura Wright
MCC E-mail: lwright@mclennan.edu (preferred method of communication)
Office Phone Number: 254-299-8419
Office Location: HP 230
Office/Teacher Conference Hours: MW 11:30am-1pm, M-Th 2:30-3:30pm or by appointment

This course meets MW 8:00 am – 11:05 am in S 214

Required Text & Materials:
- *Digital Systems: Principles and Applications*, 11th ed by Tocci, Prentice Hall, ISBN: 978-0135103821 or 0135103827
- Digital/Circuit Lab kit
- At least 4 working AA batteries
- A scientific calculator
- Access to Brightspace: This course will have a significant component on Brightspace. If you haven't yet logged into the system, learn how to do so. Log in, and make sure you can access the materials for this course.
- Four 882c scantrons

MCC Bookstore Website: http://www.mclennan.edu/bookstore/

Student Support/Resources:
MCC provides a variety of services to support student success in the classroom and in your academic pursuits to include counseling, tutors, technology help desk, advising, financial aid, etc. A listing of these and the many other services available to our students is available at http://www.mclennan.edu/campus-resource-guide/

College personnel recognize that food, housing, and transportation are essential for student success. If you are having trouble securing these resources, we encourage you to contact a success coach by calling (254) 299-8226. Students can visit the Completion Center Monday-Friday from 8:00 a.m.-5:00 p.m. to meet with a success coach and receive additional resources and support to help reach academic and personal goals. Paulanne's Pantry (MCC's food pantry) is open 12:00 p.m.-1:00 p.m., Monday-Friday, without an appointment. The Completion Center and pantry are located on the Second Floor of the Student Services Center (SSC).

Minimum Technical Skills:
Students should have basic computer skills, knowledge of word processing software, and a basic understanding of how to use search engines and common web browsers.

Backup Plan for Technology:
In the event MCC's technology systems are down, you will be contacted/notified through your MCC student email address. Please note that all assignments and activities will be due on the date specified in the Instructor Plan, unless otherwise noted by the instructor.

* **Click Here for the Minimum System Requirements to Utilize MCC's D2L|Brightspace** **(www.mclennan.edu/center-for-teaching-and-learning/teaching-commons/requirements)** Click on the link above for information on the minimum system requirements needed to reliably access your courses in MCC's D2L|Brightspace learning management system.

Additional requirements:
Students must have a reliable computer and internet connection. Students must be able to demonstrate basic computer literacy skills such as keyboarding, sending and receiving email, and using a web browser. Students may need access to Xilinx to complete assignments, which is available in the Learning Lab, room 135 in the Science Building, and can be downloaded for free.

> ***MCC Engineering uses Slack for communication.*** *All major course announcements will be posted in Slack – failure to check Slack will result in you missing important information. Also, anything we hear about jobs, scholarships, speakers, etc., will also be posted to Slack in the #general channel.*

Slack is free and used in the professional community as a workflow management system, so it is good to gain experience with the tool. All "general questions" like "I'm stuck on problem 5" will be directed to Slack, which will allow you and your classmates to support each other, especially in "time-crunch" situations. (Your classmates are a lot more likely to be up at 3 am

doing homework than I am going to be checking email.) Always be respectful and professional in your participation.

Please bear in mind that Slack is an open communication tool. Please do not ask for or reveal personal information through the tool. Note that anything you post in Slack in channels will be viewable by other channel participants. Do not post anything about personal grades, due dates, or personal issues. Do not post your own correct solutions to assignments, but you can post incorrect work and ask if anyone can see where you went wrong.

Slack can be used on both a desktop computer and as an app. For more information about Slack in general, visit https://slack.com/. You will be invited to our class channel via your MCC student account. Detailed guidelines for Slack are on Brightspace and on Slack itself.

Methods of Teaching and Learning:
Students will learn through lecture and reading, as well as through work on homework, labs, and, exams. Additional methods may be used as opportunities present themselves.

Course Objectives and/or Competencies:
Upon successful completion of this course, students will be able to:
- Utilize binary and hexadecimal numbers. *(Chapter 2)*
- Solve problems involving digital codes, operations, and number systems. *(Chapter 2 & 6)*
- Define, describe, and analyze fundamentals of Boolean algebra and digital logic gates. *(Chapter 3)*
- Describe, analyze, design, and fabricate combinational logic circuits. *(Chapter 3, 4, 9)*
- Describe, analyze, design, and fabricate sequential logic circuits. *(Chapter 5-7)*
- Describe and explain the fundamentals of memory operations. *(Chapter 10-12)*
- Apply computer mathematical and/or simulation tools to solve digital systems problems. *(All VHDL labs)*
- Prepare laboratory reports that clearly communicate experimental information in a logical and scientific manner. *(All labs)*
- Conduct basic laboratory experiments involving design and construction of digital circuits and systems. *(All labs)*
- Relate physical observations and measurements involving digital circuits and systems to theoretical principles. *(All labs)*
- Evaluate the accuracy of physical measurements and the potential sources of error in the measurements. *(All labs)*
- Design fundamental experiments involving principles of digital circuits and systems. *(All labs)*

- Identify and apply appropriate sources of information for conducting laboratory experiments involving digital circuits and systems. *(All labs)*

Course Outline or Schedule:

Date	Topic	Textbook	HW due	Lab
Mon, Aug 26	Introductory Concepts	Ch. 1		No Lab
Wed, Aug 28	Number Systems	2.1 - 2.4		Lab 1: Number Systems and Codes
Mon, Sep 2	*Labor Day - No School*			
Wed, Sep 4	Codes and error detection	2.7 - 2.9	HW 1	Lab 2: Basics of Electronics
Mon, Sep 9	Truth Tables and Boolean operations	3.1 - 3.5		Lab 3: OR, AND, NOT
Wed, Sep 11	Boolean Algebra	3.6 - 3.9	HW 2	Lab 4: NOR/NAND
Mon, Sep 16	Boolean Theorems	3.10 - 3.14		Lab 5: Boolean Algebra Theorems
Wed, Sep 18	Combinational Logic Circuits	4.1 - 4.4	HW 3	Test 1 Review
Mon, Sep 23	**Test 1 (Ch 1 - 3)**			*No Lab*
Wed, Sep 25	Karnaugh Maps	4.5 - 4.6		Lab 6: XOR/XNOR
Mon, Sep 30	CPLDs and VHDL	4.7 - 4.9		Lab 7: Intro to VHDL
Wed, Oct 2	Decoders and Encoders	9.1 - 9.4	HW 4	Lab 8: Combinational Logic
Mon, Oct 7	Multiplexers	9.6 - 9.8		Lab 9: Decoders/Encoders
Wed, Oct 9	Latches and Flip Flops	5.1 - 5.5	HW5	Test 2 Review
Mon, Oct 14	Clock Signals	5.5 - 5.7		Lab 10a: Sequential Logic
Wed, Oct 16	Asynchrounous Inputs	5.8 - 5.14	HW 6	Lab 10b: Sequential Logic in VHDL
Mon, Oct 21	Shift Registers	5.15 - 5.18		Test 2 Review
Wed, Oct 23	**Test 2 (Ch 4, 9, 5.1-5.14)**			*No Lab*
Mon, Oct 28	Digital Arithmetic	6.1 - 6.4		Lab 11: D Latches and D FFs
Wed, Oct 30	Binary, BCD and Hex Arithmetic	6.5 - 6.8	HW 7	Lab 12: Digital Arithmetic
Mon, Nov 4	Adders	6.9 - 6.15		Lab 13: Arithemetic Operations
Wed, Nov 6	Counters	7.1 - 7.4	HW 8	Lab 14: Adders
Mon, Nov 11	Counters cont.	7.5 - 7.10		Test 3 Review
Wed, Nov 13	State Machines and Special Counters	7.14, 7.17	HW 9	Lab 15: Counters
Mon, Nov 18	IC Registers	7.15 - 7.16		Lab 16: Decade Counter
Wed, Nov 20	Interfacing with the Analog World	Ch. 11		Test 3 Review
Mon, Nov 25	**Test 3 (Ch 5.15-5.18, 6, 7)**			*No Lab*
Wed, Nov 27	*Thanksgiving - No School*			
Mon, Dec 2	Memory Devices: ROM & RAM	Ch. 12		Lab Quiz!
Wed, Dec 4	Final Exam Review		HW 10	*No Lab*
Mon, Dec 9	***Final Exam 8am - 10am S214***			

*This schedule is subject to change. If I need to make changes to the schedule, I will alert the class via Slack posting and Brightspace email as soon as I possibly can. If possible, I will also make an announcement in class ahead of time.

Course Grading Information:

Grade Distribution	
Homework	20%
Labs	35%
Pop Quizzes	5%
Test Average	40%
Total	**100%**

A: 90%+   B: 80% – 89%   C: 70% – 79%   D: 60% – 69%   F: 0% – 59%

Homework: Homework is due at the beginning of class on the days marked on the syllabus. The assignments will be posted on Brightspace and some may require turning in hand-written problems. On the day a homework is due, we will spend a little time in class going over some of the more challenging homework problems. No late homework will be accepted.

Pop Quizzes: There will be at least 5 pop quizzes for which you will receive no prior warning. The quizzes will be open note, open book, but internet capable devices will not be allowed. The quiz may cover anything previously covered in class, not just material from the last class day. Pop quizzes may be given at any time during the class period. If you are not present during a pop quiz or if you arrive late for one for any reason, you may not make it up.

Tests: Three tests and a comprehensive final exam will be given during the semester. All tests are closed book, closed notes. While taking the tests, cell phones, tablets, and other internet capable devices must be put away and turned off. You will need to provide your own scantron. For tests that involve conversions between number systems, you will only be allowed a simple scientific calculator, not a graphing calculator capable of doing these conversions for you, and not your phone or tablet. You will have 2 hours to complete each exam. If you are late for class, you forfeit that amount of time to work. Makeup exams will only be given in rare cases, following the policy outlined in the syllabus. Only the best 3 out of 4 exams will be taken into the exam average.

Labs: Labs will allow the students to see the application of the concepts learned in class. You will need your digital kit to complete the labs, therefore you must bring it with you to every lab session. You will also need to bring your own AA batteries, as I cannot provide these for you. If you are found misusing the materials in your kit, you will have to replace damaged materials. Labs will typically start after the lecture is over. However, the length of the lecture will vary from day to day. You must be present to receive a grade for that day's lab. There are no lab

make-ups. You will be allowed to leave after you have completed the lab for the day. If you leave before you turn everything in, you will receive a zero on that day's lab grade. If the class period is over and you are not done with the lab, you may continue on your own time and must turn in the lab by the beginning of the next lecture period. In addition, there will be a lab quiz during the last week of the regular semester. This lab quiz will replace your lowest lab grade, unless you receive a lower grade on it than any of the previous labs. There will be no labs on test days.

Late Work, Attendance, and Make Up Work Policies:
Late assignments will not be accepted. If you have to miss class on the day that something is due, you must turn it in early. If you are legitimately ill during an in-class assessment, you must email me the morning of the exam (before you miss it), and provide a doctor's note **the first day** you are back in class in order to receive consideration for a makeup exam.

There no lab makeups. If you have to miss lab due to what MCC considers an "excused absence", you will need to speak to the instructor, preferably in advance, to set-up an appointment to make arrangements to do the lab. You will not be receiving a grade based on your lab partner's lab. Instead, you will have to complete the lab on your own.

If you are late to class, or if you leave early from class before you are dismissed, for any reason, you will receive an absence for the day. ***This means that if you are not in your seat by 8am every morning, you will be marked absent from this class.***

Attendance is mandatory. ***Per MCC policy, you will be automatically dropped after missing 25% of class meetings, or 8 lectures.*** If you are dropped before the official drop date, you will receive a grade of W. If you are dropped after the official drop date, you will receive a grade of F, unless there are highly unusual circumstances.

If you wish to drop this class, you must email me from your MCC student account before 5 pm on the last day for student-initiated drops, with the request "Please drop me from COURSE ID and SECTION NUMBER." An email that says something like, "I would like to drop…" or, "I was thinking about dropping…" or, "I was wondering if I should drop…" will **_not_** be considered a drop request. *(Just like saying, "I would like to get married," does not mean anyone is going to automatically marry you.)* If the email does not come from your student account, or if the request is verbal, I cannot drop you. Alternatively, there is a form you can fill out and have me sign before 5 pm on the last day for student-initiated drops. (Make an appointment to ensure I am on campus to provide the signature). After submitting your request, you must verify the drop was processed, notifying me in writing within 48 hours of your original request if it was not. Otherwise, you will stay on the roster for the rest of the semester and be awarded the grade

earned. Drops past the drop date are only done in documented, extreme, life-crisis circumstances, which usually involve withdrawing from school entirely.

MCC allows for "excused" absences caused by (1) authorized participation in official College functions, (2) personal illness, (3) an illness or a death in the immediate family, or (4) the observance of a religious holy day.   It is your responsibility to let me know the reason for an absence the day you return to campus and provide sufficient documentation (doctor's note, email from coach, etc.).

Normally, please do not bring your children, friends, or guests to the class. (Please discuss this with me because I do not want you missing class if you cannot make child care arrangements.)

Student Behavioral Expectations or Conduct Policy:
Students are expected to maintain classroom decorum that includes respect for other students and the instructor, prompt and regular attendance, and an attitude that seeks to take full advantage of this educational opportunity.

- Cell phone usage, either voice or text, not directly pertaining to coursework will not be tolerated during class. The student will be asked to leave the classroom. This will result in a recorded absence for the class meeting.
- Computer usage, for academic or personal reasons, not directly pertaining to coursework will not be tolerated during class. The student will be asked to leave the classroom. This will result in a recorded absence for the class meeting.
- Listening to audio input (i.e. music/podcasts) not related to course material during lecture/presentations is unacceptable. The student will be asked to leave the classroom. This will result in a recorded absence for the class meeting.
- Please do not bring young children with you to the classroom. While they are cute, they are also a distraction.
- The student must send all email messages to the instructor using their MCC provided student email account (firstinitiallastinitialstudentIDnumber@students.mclennan.edu). The instructor will send all emails to the students' MCC email accounts. Students are expected to check their MCC student email accounts on a regular basis while enrolled in this course.
- Students who are having trouble with technology should contact the Tech Support at (254) 299- 8077 M-F 8:00 am to 5:00 pm or (254) 299-6202 after hours.

* **[Click Here for the MCC Academic Integrity Statement](www.mclennan.edu/academic-integrity)**
(**www.mclennan.edu/academic-integrity**)

The link above will provide you with information about academic integrity, dishonesty, and cheating.

* **Click Here for the MCC Attendance/Absences Policy**
(www.mclennan.edu/highlander-guide/policies)
Click on the link above for the college policies on attendance and absences. Your instructor may have guidelines specific to this course.

Accommodations/ADA Statement
Any student who is a qualified individual with a disability may request reasonable accommodations to assist with providing equal access to educational opportunities. Students should contact the Accommodations Coordinator as soon as possible to provide documentation and make necessary arrangements. Once that process is completed, appropriate verification will be provided to the student and instructor. Please note that instructors are not required to provide classroom accommodations to students until appropriate verification has been provided by the Accommodations Coordinator. Instructors should not provide accommodations unless approved by the Accommodations Coordinator. For additional information, please visit mclennan.edu/disability.

Students with questions or who require assistance with disabilities involving physical, classroom, or testing accommodations should contact:
> disabilities@mclennan.edu
> 254-299-8122
> Room 319, Student Services Center

* **Click Here for more information about Title IX**
(www.mclennan.edu/titleix)
We care about your safety, and value an environment where students and instructors can successfully teach and learn together. If you or someone you know experiences unwelcomed behavior, we are here to help. Individuals who would like to report an incident of sexual misconduct are encouraged to immediately contact the Title IX Coordinator at titleix@mclennan.edu or by calling Dr. Drew Canham (Vice President for Student Success) at 299-8645. Individuals also may contact the MCC Police Department at 299-8911 or the MCC Student Counseling Center at MCC by calling 299-8210. The MCC Student Counseling Center is a confidential resource for students.

McLennan's Title IX webpage (http://www.mclennan.edu/titleix/) contains more information about definitions, reporting, confidentiality, resources, and what to do if you or someone you

know is a victim of sexual misconduct, gender-based violence or the crimes of rape, acquaintance rape, sexual assault, sexual harassment, stalking, dating violence or domestic violence.

* *You will need to access each link separately through your Web browser (for example: Internet Explorer, Mozilla, Chrome, or Safari) to print each link's information.*