COURSE TITLE: ENGR 271 Digital Logic Design

CREDITS: 3

ROOM: IA-215

CRN: 43193

LECTURE: (Pre Recorded Lectures Online)

RECITATION: (IA-215) (Time you can ask Questions as a class): Monday 2:00 to 2:50 pm

IN-CLASS EXAMS: (IA-215)

- **Exam #1:   Monday Apr 18, 2022 at 1:00 to 2:50 pm**
- **Exam #2:   Monday May 2, 2022 at 1:00 to 2:50 pm**
- **Exam #3:   Monday May 16, 2022 at 1:00 to 2:50 pm**
- **Final Exam: Wednesday Jun 8, 2022 at 3:00 to 4:50 pm**
  https://www.linnbenton.edu/calendars/finals-schedule.php

LABS: ENGR272 (IA-215)

INSTRUCTOR: Craig Munsee

EMAIL: munseec@linnbenton.edu

OFFICE: IA-206

OFFICE HOURS (Additional time you can ask Questions):
- **Tuesday 3:00 pm to 3:50 pm in IA-206**
- **Wednesday Noon - 12:50 pm in IA-206/Zoom (Zoom Meeting: Link in Moodle)**
- **Thursday Noon - 12:50 pm (Zoom Meeting: Link in Moodle)**
- **Friday Noon - 12:50 pm (Zoom Meeting: Link in Moodle)**
- **Others by Appointment**

Course Description:
- Provides an introduction to digital logic and state machine design. Covers logic design, including logic gates, gate minimization methods, and design with standard medium scale integration (MSI) logic circuits. Includes basic memory elements (flip-flops) and their use in simple-state machines.

Prerequisite(s):
- Prerequisite: MTH 231 Elements of Discrete Mathematics or MTH 251 Differential Calculus with a grade of "C" or better.

Course Outcomes:
- Upon successful completion of this course, students will be able to:

1. Analyze and design combinational theoretical systems using standard gates and minimization methods.
2. Analyze and design combinational theoretical systems composed of standard combinational modules, such as multiplexers and decoders.

3. Analyze and design simple theoretical synchronous sequential systems.
4. Analyze and design sequential theoretical systems composed of standard sequential modules, such as counters and registers.
5. Analyze and design simple theoretical systems composed of programmable logic devices.

Text Book:
- **Digital Design and Computer Architecture, ARM Edition**. Authors: Sarah Harris David Harris or Digital Design and Computer Architecture, 2nd Edition. Authors: Sarah Harris David Harris.

- **Digital Design and Computer Architecture: ARM Edition, is available for free to the students through the LBCC Library's Ebook Central database.** http://bit.ly/digides

Grading:

Assignment:	Number:	Percentage:
Homework	10	30%
Exams	4	70%
Total		**100%**

- 90-100% A, 80-89% B, 70-79% C, 60-69% D, $< 59\%$ F
- The class is designed to go over the material in the lectures and work through the example problems. After completing the weeks' worth of lectures, you should be ready to work on the homework. You are given one additional week to complete the homework and turn it in. This is also the case for the labs. This gives you the opportunity to work on the assignment over the weekend and be able to ask question before the assignment is due. If you wait till the day the assignment is due, you run the risk of not being able to get answers to questions and possibly not completing the assignment on time.
- There will not be any extra assignments given beyond those listed, so please **do not** email the instructor to ask if there is anything extra you can do to improve your grade.

Homework:
- Homework problem sets are linked in Moodle and are to be turned in to Moodle by 11:55 PM on the day they are due. If there is a problem with Moodle, you may email the assignment to the instructor.
- Homework is to be scanned to a PDF and turned in to Moodle for grading.
- **The lowest homework grade will be dropped.**
- **Late homework will not be accepted unless an extension has been requested prior to the due date. A student is allowed only one two-day extension for a homework assignment.**
- Each problem will be checked for a reasonable attempt at solving.
- Solutions to the homework problems will be posted in Moodle after the homework is due.
- The Student is responsible for turning the homework in on time and in the recommended format. They are also responsible for turning in the correct homework. If the homework is not turned in on time or the wrong assignment has been submitted, a score of zero will be given for that assignment.

Exams:
- The exams will be in-class timed tests and will only be given on the day indicated above.
- **If you miss the exam on the day it has been offered, it is the reasonality of the student to**

arrange for a make-up exam. There will be a 10% grade penalty for each additional day you are later than the original exam date.

- No exam grades will be dropped.

Inservice/Holidays:
- School Inservice: LBCC will be closed (**Friday, Apr 1, 2022**)
- Memorial Day: LBCC will be closed (**Monday, May 30, 2022**)

Class Climate Survey:
- Student feedback is important to improve this course and to help the instructor know how to adjust teaching methods. Your feedback is taken seriously and does influence future versions of the course. The evaluations are anonymous, and links to the evaluations will be emailed to your student LBCC email account after the 5th week of the term. I encourage you take this opportunity to provide constructive feedback on the class. Thank you in advance for your input!
- **Extra Credit will be given for those who completing the Class Climate Survey**. Since the survey is anonymous you are asked to attach a screen shot showing that you completed the survey (Not a screen shot of your answers). A place to turn this in can be found on week 7 of Moodle.

Academic Integrity:
- You are expected to turn in your own work and not take credit for the work of others.
- For Homework and Lab assignments, you may work together and discuss the problems with your classmates, but you are expected to turn in your own work. If you turn in something that is not your work, it is considered cheating (This includes copying and sharing computer files).
- **No collaboration is allowed for Exams.**
- **Depending on the severity of the incident, those caught cheating and those who aid them will receive a score of zero for that assignment or fail the class and will be reported to Jill Childress, Ed. D. | Manager, Student Conduct and Retention.**

Computer & Software Requirements:
- You will need a computer capable of running the Digital Electronics DEEDS software, Quartus Prime Lite software, and ModelSim. All are windows versions.
- To use a Mac computer, a windows environment would need to be installed on the computer to run the software (Oracle's VirtualBox).
  - https://www.virtualbox.org/
- You should install these programs the first week to determine if your computer can run the programs correctly.
- If you are considering purchasing a new computer, I would recommend a Windows-based Laptop with an Intel i7 processor, 16 GB of RAM, and at least a 500 GB hard drive. MacOS computers are good computers too, but are limited when it comes to compatibility for Engineering software.

College Policies

COVID-19 CLASSROOM REQUIREMENTS FOR ALL STUDENTS AND FACULTY

Linn-Benton Community College has established rules and policies to make the return to the classroom as safe as possible. It is required for everyone to follow all of the campus rules and policies. To participate in this class, LBCC requires all students to comply with the following: https://www.linnbenton.edu/about-lbcc/college-services/safety/covid19/index.php

WHERE TO REPORT A POSITIVE CASE OF COVID AND HOW TO KNOW IF YOU NEED TO QUARANTINE

In the event of a positive diagnosis of coronavirus, we appreciate your support in reporting it to our Office of Finance and Operations by contacting floms@linnbenton.edu. College administration will then work with local health authorities to begin contact tracing, and others who may have been exposed will be notified. The identity of the individual or individuals infected will be kept confidential, but you will be informed if a quarantine is necessary. If you are not informed about a close contact, you do not need to quarantine.

Drop/Withdraw Policy:

If you are withdrawing from the class, you must file a Schedule Change Form with Registration or use WebRunner. If you formally drop the class **before Monday of the second week of the term**, you will receive a tuition refund. If you withdraw after the Monday of the second week of instruction through the seventh week a **'W'** will show up on your transcript. **No withdrawals are allowed after the end of the seventh week**. An instructor may not assign a "W" grade.

If you received financial aid or veteran's benefits, PLEASE talk with associates at the appropriate office to determine what effects on eligibility dropping a course will have. Don't jeopardize your eligibility!! You can contact the Financial Aid Office by calling (541) 917-4850 or by visiting the Financial Aid Office in Takena Hall.

If you stop attending the course without formally withdrawing you will continue to accumulate grades (zeroes for all assignments not turned in) and will receive the grade assigned by the instructor. You will also be held accountable for all charges on your account.

LBCC Comprehensive Statement of Nondiscrimination:

Linn-Benton Community College does not discriminate based on race, color, religion, ethnicity, use of native language, national origin, sex, sexual orientation, gender, gender identity, marital status, disability, veteran status, age, or any other status protected under applicable federal, state, or local laws in its programs or activities. For further information see Board Policy 1015 and Administrative Rule 1015-01. The following staff members have been designated to handle inquiries regarding the nondiscrimination policies:

For concerns or inquiries regarding disability accessibility and accommodations:

Contact: Carol Raymundo, Director of Center for Accessibility Resources
RCH-101, Albany Campus, Albany, OR 97321
(541) 917-4789
raymundo@linnbenton.edu

For concerns or complaints about the College or an LBCC staff member:

Contact: Scott Rolen, Director of Human Resource Development and Support and Title IX Coordinator
CC-108, Albany Campus, Albany, OR 97321
(541) 917-4425

rolens@linnbenton.edu

For concerns or complaints about a student:
Contact: Jill Childress, Manager for Student Conduct and Retention and Title IX Coordinator
WH-215, Albany Campus, Albany, OR 97321
(541) 917-4806
childrj@linnbenton.edu

Request for Special Needs or Accommodations:
Direct questions about or requests for accommodations to the Center for Accessibility Resources, 541-917-4789 or cfar@linnbenton.edu at least three business days in advance for special events and as soon as possible for classroom or other emerging requests. LBCC will make every effort to honor requests. LBCC is an equal opportunity educator and employer.

Student Resources:
LBCC has many resources to help our students be successful and overcome difficulties so that you can focus on learning. If you have a need, please contact your advisor for assistance and they can help direct you to the services you need. A list of some of these resources can be found in Aviso or the link below. https://linnbenton.avisoapp.com/aviso/app/resourceGuide/index

Changes to the Syllabus
I reserve the right to change the contents of this syllabus due to unforeseen circumstances. You will be given notice of relevant changes in class, or through LBCC e-mail.

ENGR 271 Class Schedule:

Week:	Topics Covered:	Assignments Due:
1 **Mar 28**	• Syllabus • Number Systems	• Syllabus Quiz (**Take by Sunday Apr 3**)
2 **Apr 4**	• Logic Gates • Combinational Logic Design • Boolean Equations • ENGR271 ICA 2	• Homework #1 (**Due on Wednesday Apr 6**)
3 **Apr 11**	• Simplifying Equations • Karnaugh Maps • ENGR271 ICA 3 • Intro to Deeds Software	• Homework #2 (**Due on Wednesday Apr 13**)
4 **Apr 18**	• Logic Design Part 1 • Logic Design Part 2 • ENGR271 ICA 4	• **Exam #1 (Monday Apr 18)** • Homework #3 (**Due on Wednesday Apr 20**)
5 **Apr 25**	• Timing • Hardware Description Languages (HDLs) Part 1 • LATCHES AND FLIP-FLOPS • SYNCHRONOUS LOGIC DESIGN • ENGR271 ICA 5	• Homework #4 (**Due on Wednesday Apr 27**)
6 **May 2**	• State Machine Example 1 • State Machine Example 2 • Working with other Flip-Flops	• **Exam #2 (Monday May 2)** • Homework #5 (**Due on Wednesday May 4**)
7 **May 9**	• Design of Counters • Registers • Mealy State Machines • ENGR271 ICA 6	• Homework #6 (**Due on Wednesday May 11**)
8 **May 16**	• State Reduction • Implication Table State Reduction • HDL Parser and Lab 5 Help	• **Exam #3 (Monday May 16)** • Homework #7 (**Due on Wednesday May 18**)
9 **May 23**	• Hardware Description Languages (HDLs) Part 2 • ENGR271 ICA 7 • Deriving a FSM from a Schematic • ENGR271 ICA 9	• Homework #8 (**Due on Wednesday May 25**)
10 **May 30**	• Dead Week	• Homework #9 (**Due on Wednesday Jun 1**)
Finals **Jun 6**		• **Final Exam (Wednesday Jun 8)**