Department of Engineering Science
Syllabus

Course Name: Fundamentals of Digital Logic Design Laboratory
Course Number: EE 112
Section: 001
Credit Hours: 1.0
Semester Offered: Fall 2018
Course Meeting Days/Time: M 1:00 PM – 3:50 PM
Classroom: Salazar 2001

Instructor: Dr. Sara Kassis
Office: Salazar 2010A
Telephone: 707-664-4438
Email: sara.kassis@sonoma.edu *(preferred method of contact)
Office Hours: Mondays 12 – 1:00 PM or by appointment

Course Description (1 Unit; 3-Hour Lab): Binary system, digital logic, logic gates, minimization techniques, universality, combinatorial logic and design of simple combinatorial logic circuits such as 1-bit adder; concept of coders, decoders, and integrated circuits.

Course Learning Objectives: Upon successful completion of this course, students will be able to:
A. Design and conduct experiments to understand functions of basic logic gates
B. Design and conduct experiments for combinatorial logic gates
C. Design and conduct experiments using minimization techniques to simplify circuits

Course Outcomes: The objectives of this course are to:
1. Introduce the basic concept of digital and binary systems
2. Give students the concept of digital logic design
3. Give students the basic tools for the design and implementation of digital modules and subsystems
4. Reinforce theory and techniques taught in the classroom through project and laboratory assignments.

Required Materials:
• Breadboard, capacitors, resistors, inductors, tackle box, etc. as described in my email and in Moodle.
• Student Lab Notebook, bound and graph ruled.
• Pen, calculator, etc., as needed.
Textbook References: I will be using these texts for reference. You do not need to purchase any copies, unless you would like to.


Moodle Page: I use Moodle for uploading documents and recording grades. You will find the syllabus, Pre-Labs, and the Lab Manual here. I will also post notes about the class and I will email you through Moodle. Please check Moodle and your Sonoma State email often.

Moodle can be accessed through your Seawolf Login:
- Log into SSU Online Services
- Click on Moodle
- Under ‘Navigation’ click on ‘My Courses’
- Click on ‘EE-112’
- You can even use Moodle Mobile through your smart device with Moodle Mobile

Course Grade Evaluation Policy:
The class grade will be based upon the following activities.

1) Grading

<table>
<thead>
<tr>
<th>Attendance/ Quizzes</th>
<th>15%</th>
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<tbody>
<tr>
<td>Pre - Labs</td>
<td>15%</td>
</tr>
<tr>
<td>Labs (includes effort, participation, teamwork, and correct results)</td>
<td>40%</td>
</tr>
<tr>
<td>Lab Reports</td>
<td>15%</td>
</tr>
<tr>
<td>Project/Presentation</td>
<td>15%</td>
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<tr>
<td>Total =</td>
<td>100%</td>
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<table>
<thead>
<tr>
<th>Grade</th>
<th>Minimum Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>≥93%</td>
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<tr>
<td>A-</td>
<td>≥90%</td>
</tr>
<tr>
<td>B+</td>
<td>≥87%</td>
</tr>
<tr>
<td>B</td>
<td>≥83%</td>
</tr>
<tr>
<td>B-</td>
<td>≥80%</td>
</tr>
<tr>
<td>C+</td>
<td>≥77%</td>
</tr>
<tr>
<td>C</td>
<td>≥73%</td>
</tr>
<tr>
<td>C-</td>
<td>≥70%</td>
</tr>
<tr>
<td>D+</td>
<td>≥67%</td>
</tr>
<tr>
<td>D</td>
<td>≥60%</td>
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<tr>
<td>F</td>
<td>&lt;60%</td>
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</tbody>
</table>
Your final grade is based on the percentage of points earned. In borderline cases, effort and participation may also count. Don’t miss anything! Try your best!

2) **Late Work:** Any work submitted after the end of class is considered late and will receive a 10% grade reduction. After one week, the instructor may refuse to accept it. Let the instructor know as soon as possible about extenuating circumstances.

3) **Missed work:** One missed lab can be made up during the last week of classes. Otherwise, more than one missing lab will be graded as a zero. Please note that a failing grade will be given for two or more missing labs.

**Pre – Labs:** The topic of these pre-lab assignments will be covered in the lab for that day. You will have to download and print them from our Moodle page, complete the assignment, and hand it in at the beginning of each class.

**Quizzes:** Quizzes will occasionally be given to reinforce topics and assess student understanding of topics.

**Lab Notebooks:** You will need to keep your notebook for every lab experiment you conduct in class. It must be a bound, graph-ruled notebook. If you do not bring in the proper notebook, you will be asked to purchase the appropriate one. Points will be deducted if the correct supplies are not obtained in a timely manner.

A specific format for keeping notes is required. Good note keeping habits are important! A well-kept notebook provides a reliable reference for writing up materials, methods, and results. It is a legally valid record that preserves the rights of an inventor, should you want to patent an invention. Notes need to be organized and legible.

The lab book format is as follows:

- Title of the experiment, date, and all partners’ names
- Purpose of the experiment
- Brief procedure
- Simple sketch of the experiment labeled with important information
- Include data and statistical results with units.
- Brief summary, conclusions, sources of error and answers to any questions posed
- Any needed printouts to be cut down and stapled to your notebook

Your experiment must be checked by and signed by the instructor at the completion of the lab before you leave. If this is not signed, it will result in a loss of points and/or a refusal of acceptance by the instructor.

**Lab Data Sheets:** Along with keeping your notebook, you will input the data from the experiment into the Lab Data Sheets, which are found at the end of the lab procedure. It is your responsibility to print
out the Lab Data Sheet, fill it out with the results of the experiment, and hand it to the instructor at
the completion of the lab.

**Lab Reports:** A formal report of your experiments will be required for two of the experiments from the
entire semester. **You have one week to turn in your lab report after the experiment is complete.** It can
either be submitted as a hard copy or you may hand in a soft copy (if it is a soft copy, it must be saved as
a PDF file and uploaded to Moodle). In either case, it is to be submitted **before the beginning of the lab**
on the day it is due (as found on the schedule below).
Your name, the course name, date and names of laboratory partner(s) should appear on first page. You
may include a title page if you wish but it is not necessary. **Label each section with the section title.** The
following are the sections:
- Abstract
- Theory and Procedure
- Diagrams with Labels
- Data/Graphs/Tables
- Discussion and Conclusion

**Project and Presentation:** Every student will work on an individual project that is due at the end of the
semester. The student will present the project to the whole class during the last day of class. This is what
I am looking for in a project and presentation:
- Product must be **working** and fully functioning during the presentation (40% of grade)
- 5 minute Power Point presentation (show materials used, perhaps a schematic diagram,
  anything else you deem useful to explain your project; talk about what you learned, what was
  challenging) (20% of grade)
- Points will be given for overall quality of presentation, including explanation of what you are
doing and how it works (40% of grade)
- Be creative and, above all, have fun!
Students are required to show proof of the SETE (more details below) **before** presenting. Students will
be required to submit their notebooks during this time and attendance will be recorded. Notebooks will
be handed back to the students at the earliest possible time.
More details will be given later in the semester.

**Academic Status Forms:** It is essential to have a solid knowledge of mathematics and a firm
understanding of fundamental engineering principles (e.g. conservation of mass, momentum, energy)
introduced in calculus-based physics. Therefore, it is essential that you succeed in your physics and
calculus courses prior to taking your upper-level engineering courses.

To ensure that you are succeeding in your Math and Physics classes, all EE students enrolled in ES 110 &
ES 112 **must complete this form and have it signed by the current Math and Physics instructors TWO
times during the semester.** If you are not taking any Math or Physics classes, then you will still need to
fill out the form and circle the appropriate options. This form is **required** and is to be handed in to me on
October 8 and November 5, 2018. Failure to turn in the forms on the designated dates will result in a
letter grade reduction from your overall score. Please be sure to turn in the forms regardless of if you are not taking Math and Physics this semester.

**Tutoring:** We encourage all our engineering students to take advantage of the free Math and Physics tutoring sessions throughout School of Science and Technology. The schedule is may be found at [http://www.sonoma.edu/engineering/activities/tuturing.html](http://www.sonoma.edu/engineering/activities/tuturing.html)

**Advising:** It is observed that a better understanding of the engineering requirements, as found on the [Engineering Academic Roadmap](http://www.sonoma.edu/engineering/activities/tuturing.html), results in a smoother process when pursuing the Electrical Engineering degree.

Your academic advising session will take place during class on Monday, October 22. You will be asked to set aside 10 minutes of lab time to have an individual academic advising session with an academic advisor. Please be sure not to miss class on Advising Day!

**Extra Credit:** An opportunity for extra credit is available simply by getting involved in the departments’ student engineering clubs and attending the meetings. We have the [Electrical Engineering Club](http://www.sonoma.edu/engineering/activities/tuturing.html) and the [Society of Women Engineers Club](http://www.sonoma.edu/engineering/activities/tuturing.html). A maximum of 3% may go towards the total class grade.

*Never miss an opportunity to ask me a question. Please come to my office hours or email me!*
## Class Schedule: Tentative

<table>
<thead>
<tr>
<th>Date</th>
<th>Lab No.</th>
<th>Notes</th>
<th>Notes</th>
<th>Reports Due</th>
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<tbody>
<tr>
<td>Aug 20</td>
<td>1</td>
<td>Introduction &amp; Testing the Breadboards</td>
<td></td>
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<tr>
<td>Aug 27</td>
<td>2</td>
<td>Basic Logic Circuits</td>
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<td>Sep 3</td>
<td></td>
<td>Labor Day – No Class</td>
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<tr>
<td>Sep 10</td>
<td>3</td>
<td>Simple Combination Circuits</td>
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<td>Sep 17</td>
<td>4</td>
<td>Not-So-Simple Combination Circuits</td>
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<tr>
<td>Sep 24</td>
<td>5</td>
<td>Simplifying Circuits</td>
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<td>Lab 4</td>
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<tr>
<td>Oct 1</td>
<td>6</td>
<td>Simplifying Circuits 2</td>
<td></td>
<td></td>
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<tr>
<td>Oct 8</td>
<td>7</td>
<td>Universality of NAND and NOR Gates</td>
<td>Academic Status Form Due</td>
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<tr>
<td>Oct 15</td>
<td>8</td>
<td>Karnaugh Maps</td>
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<tr>
<td>Oct 22</td>
<td>9</td>
<td>XOR and XNOR</td>
<td>Group Advising</td>
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<tr>
<td>Oct 29</td>
<td>10*</td>
<td>Half Adders</td>
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<tr>
<td>Nov 5</td>
<td>11</td>
<td>Designing Logic Circuits</td>
<td>Academic Status Form Due</td>
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<tr>
<td>Nov 12</td>
<td></td>
<td>Veteran’s Day – Campus Closed</td>
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<td>Nov 19</td>
<td>12*</td>
<td>Code Conversion</td>
<td>Lab 11</td>
<td></td>
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<tr>
<td>Nov 26</td>
<td></td>
<td>Make-Up Lab/ Work on Projects</td>
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<tr>
<td>Dec 3</td>
<td></td>
<td>Project Presentations – 5 min each person</td>
<td>SETE</td>
<td>Project Report</td>
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<tr>
<td>Dec 10</td>
<td></td>
<td>Finals Week - No Final Exam</td>
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</tbody>
</table>

*Project Updates: I need to know your progress on your projects during these times

**Online Class Survey (online SETE)**

All students must complete the Online Class Survey (online SETE) prior to the last class (project presentations). Information given by the student to assess a course and the instructor is essential in maintaining quality instruction at our department and at SSU. You must provide evidence of the submission (such as a screen shot) prior to presenting your project. Failure to do so will result in loss of points.

**Important Dates**

- **8/31**: Last day to Drop a course
- **9/1 – 9/14**: Drop with a "W" (done on-line)
- **11/21 – 11/23**: Thanksgiving Break
- **12/7**: Last day of instruction
- **12/10-12/14**: Finals Week
University Policies
There are important University policies that you should be aware of, such as the add/drop policy; cheating and plagiarism policy, grade appeal procedures; accommodations for students with disabilities and the diversity vision statement. See Important Policies and Procedures for Students http://www.sonoma.edu/uaffairs/policies/studentinfo.shtml.

Dropping and Adding
Students are responsible for understanding the policies and procedures about add/drops, academic renewal, etc. How to Add a Class http://www.sonoma.edu/registration/addclasses.html has step-by-step instructions. Registration Information http://www.sonoma.edu/registration/regannounce.html lists important deadlines and penalties for adding and dropping classes.

Campus Policy on Disability Access for Students
If you are a student with a disability, and think you may need academic accommodations, please contact Disability Services for Students (DSS), located in Salazar Hall, Room 1049, Voice: (707) 664-2677, TTY/TDD: (707) 664-2958, as early as possible in order to avoid a delay in receiving accommodation services. Use of DSS services, including testing accommodations, requires prior authorization by DSS. See SSU's policy on Disability Access for Students http://www.sonoma.edu/uaffairs/policies/disabilitypolicy.htm.

Emergency Evacuation
If you are a student with a disability and you think you may require assistance evacuating a building in the event of a disaster, you should inform your instructor about the type of assistance you may require. You and your instructor should discuss your specific needs and the type of precautions that should be made in advance of such an event (i.e. assigning a buddy to guide you down the stairway). We encourage you to take advantage of these preventative measures as soon as possible and contact the Disability Services for Students office if other classroom accommodations are needed.

Academic Integrity
Students should be familiar with the University’s Cheating and Plagiarism policy http://www.sonoma.edu/UAffairs/policies/cheating_plagiarism.htm. Your own commitment to learning, as evidenced by your enrollment at Sonoma State University and the University’s policy, require you to be honest in all your academic course work. Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person’s ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified.

Counseling and Psychological Services (CAPS)
CAPS is a unit of the division of Student Affairs of Sonoma State University. CAPS offers confidential counseling to students experiencing personal problems that interfere with their academic progress, career or well being. The CAPS website http://www.sonoma.edu/counselingctr provides information
only. If you would like to talk with someone or make an appointment, please call (707) 664-2153 between 8 a.m. - 4:30 p.m., Monday-Friday.

**ABET Requirements:**

<table>
<thead>
<tr>
<th>Student Learning Outcomes vs. Course Learning Objectives:</th>
<th>Course Learning Outcomes</th>
<th>Level of Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Support Level (0-5) 0=No support, 1=lowest support, 5=highest support)</td>
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<tr>
<td>ABET Student Outcomes</td>
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<tr>
<td>(a) an ability to apply knowledge of mathematics, science, and engineering</td>
<td>A, B, C</td>
<td>3</td>
</tr>
<tr>
<td>(b) an ability to design and conduct experiments, as well as to analyze and interpret data</td>
<td>A, B, C</td>
<td>4</td>
</tr>
<tr>
<td>(c) an ability to design a system, component, or process to meet desired needs</td>
<td>A, B, C</td>
<td>4</td>
</tr>
<tr>
<td>(d) an ability to function on multi-disciplinary teams</td>
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<tr>
<td>(e) an ability to identify, formulate, and solve engineering problems</td>
<td>A, B, C</td>
<td>3</td>
</tr>
<tr>
<td>(f) understanding of professional and ethical responsibility</td>
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<td></td>
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<tr>
<td>(g) an ability to communicate effectively</td>
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<tr>
<td>(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context</td>
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<tr>
<td>(i) a recognition of the need for, and an ability to engage in life-long learning</td>
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<td>(j) a knowledge of contemporary issues</td>
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<tr>
<td>(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice</td>
<td>A, B, C</td>
<td>3</td>
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**Assessment Methods:**

**Assessment of student learning for each of the Course Learning Objectives:**

A. Design and conduct experiments to understand functions of basic logic gates  
   a. Student lab reports  
   b. Quizzes, Pre-Labs  
   c. Project  
B. Design and conduct experiments for combinatorial logic gates  
   a. Student lab reports  
   b. Quizzes, Pre-Labs  
   c. Project  
C. Design and conduct experiments using minimization techniques to simplify circuits
a. Student lab reports
b. Quizzes, Pre-Labs
c. Project

Course quality Assessment
1. Student survey of the course
2. Peer instructors feedback