EEL 3712 Spring 2021

Department of Electrical and Computer Engineering

# EEL 3712- LOGIC DESIGN I
**Fall 2022**

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|---|---|---|
| Instructor | : | Dr. Mercedes Cabrerizo |
| Office Hours | : | *by appointment* |
| | | *Tuesday & Thursday: 11:00 am- 12:15 pm* |
| Office | : | *EC- 2221* |
| Sec. Phone | : | 305.348.7053 |
| E-mail | : | cabreriz@fiu.edu |
| Class | : | TBD |
| Web Page | : | web.eng.fiu.edu/mcabre05 |

**Catalog Description:**
Logic problem solving process, overview of the basic components of combinational and sequential logic circuits.
(3 Credits)

**Reference Textbook:**
Fundamentals of Logic Design
7th Ed, Charles H. Roth & Larry L. Kinney, 2014

**Course Objectives:**
Through successful completion of the course, the student will:
> Learn about the basic components of combinational and sequential logic circuits, and about techniques for designing circuits using these components. Introduce various formal logic and arithmetic concepts such as Boolean algebra, number systems, and Karnaugh maps that will help to analyze circuits and optimize their design.

**ABET Relationship of course to program outcomes:**
  (Select corresponding boxes below to applicable program outcomes for the course.)

☒ 1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

☒ 2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

☐ 3. an ability to communicate effectively with a range of audiences.

☐ 4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

☐ 5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

☐ 6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

☒ 7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

| Grading Scale: | | University's Code of Academic Integrity http://academic.fiu.edu/academic_misconduct.html |
|---|---|---|
| A | 92-100 | "Florida International University is a community dedicated to generating and imparting knowledge through excellent teaching and research, the rigorous and respectful exchange of ideas, and community service. All students should respect the right of others to have an equitable opportunity to learn and honestly to demonstrate the quality of their learning. Therefore, all students are expected to adhere to a standard of academic conduct, which demonstrates respect for themselves, their fellow students, and the educational mission of the University. All students are deemed by the University to understand that if they are found responsible for academic misconduct, they will be subject to the Academic Misconduct procedures and sanctions, as outlined in the Student Handbook." |
| A- | 90-92 | |
| B+ | 88-90 | |
| B | 82-88 | |
| B- | 80-82 | |
| C+ | 78-80 | |
| C | 70-78 | |
| D | 60-70 | |
| F | < 60 | |

**Department Regulations Concerning Incomplete Grades**

*To qualify for an Incomplete, a student:*

1. Must contact (e.g., phone, email, etc.) the instructor or secretary before or during missed portion of class.
2. Must be passing the course prior to that part of the course that is not completed
3. Must make up the incomplete work through the instructor of the course
4. Must see the Instructor. All missed work must be finished before last two weeks of the following term.

**University Policies:** on sexual harassment, and religious holidays, and information on services

for students with disabilities

http://academic.fiu.edu/
http://drc.fiu.edu

**Policies:**

- **Academic Misconduct:** For work submitted, it is expected that each student will submit their own original work. Any evidence of duplication, cheating or plagiarism will result at least a failing grade for the course.

- **Unexcused Absences:** Two unexcused absences are permitted during the term. More than two will result in the loss of points from your final grade. (1 point per absence above two, 3 points per absence above 5).

- **Excused Absences:** Only emergency medical situations or extenuating circumstances are excused with proper documentation. 1) review documentation with the lecturer, and 2) email as a written record to cabreriz@fiu.edu, Name, SID, class, section, description and date of the absence.

- **On Time:** As in the workplace, on time arrival, preparation, and submissions are required.

- **Deadlines: Work is due on the date specified.** Late submissions within one week will receive up to half credit. After one week, **late work will not be accepted**. Late submissions are graded after the final exam. Participation deadlines are absolute – no late completions are accepted.

- **Submissions: This class is paperless**. Submissions are made using the web form listed on the class web site (online and in class sections) See the class web site for instructions. All submissions must be: a single document, web accessible and readable with a browser, and with a single URL reference.

- **DO NOT** submit work by email.

- Instructor reserves right to change course materials or dates as necessary.

**Grading Scale: NOTE:** There are *no makeup exams* offered

| Topic | Percentage |
|---|---|
| Exam 1 *no makeup* | 40% |
| Exam 2 *no makeup* | 50% |
| Homework | 10% |
| Attendance | Unexcused absence penalty based on in class policy |

| Wk. | Date (Mon) | 3712 Weekly Topic FAll 2022 Tuesday /Thursday topics | Homework: Due |
|---|---|---|---|
| 01 | 08/23/22 | Syllabus, Introduction to basic logic, Numbering system | |
| 02 | 08/25/22 | Introduction to positive and negative logic, number system. **Drop/Add ends 10/31/2022 at 11:59pm** | |
| 03 | 08/30/22 | Boolean algebra: Operations: addition, subtraction, multiplication and division, Introduction to logic gates, theorems and laws | |
| 04 | 09/01/22 | Boolean algebra: Operations: multiplication and division, Introduction to logic gates, theorems and laws | |
| 05 | 09/06/22 | SOP, POS, Simplification | HW01 Conversion, Multiplication/ division |
| 06 | 09/08/22 | Minterm expansion, implementation of K-maps | |
| 07 | 09/15/22 | Excusive OR operations | HW02 Boolean Simplification |
| 08 | 09/20/22 | Equivalence operations | |
| 09 | 09/22/22 | Simplify combining all steps | |
| 10 | 09/27/22 | Multi-level gates: AND | |
| 11 | 09/29/22 | Multi-level gates:  OR | |
| 12 | 10/04/22 | Multi-level gates: NAND | |
| 13 | 10/06/22 | Multi-level gates: NOR. Combinational circuit design | HW03 K-Maps |
| 14 | 10/11/22 | **Review Test #1** | |
| 15 | 10/13/22 | **Exam #1** | |
| 16 | 10/18/22 | Testing circuits, Multiplexers design | HW04 Circuit design |
| 17 | 10/20/22 | Decoders design | |
| 18 | 10/25/22 | Programmable logic devices: | |

| | | PAL | |
|---|---|---|---|
| 19 | 10/27/22 | Programmable logic devices: PLA | |
| 20 | 11/01/22 | Introduction to latches | HW05 Multiplexers, PAL, and PLA |
| 21 | 11/03/22 | introduction to sequential circuits | |
| 22 | 11/08/22 | Introduction to Registers | |
| 23 | 11/10/22 | Introduction to Counters | |
| 24 | 11/15/22 | Design with flip-flops | HW06 Registers, sequential circuits |
| 25 | 11/17/22 | Counter design | |
| 26 | 11/22/22 | Derivation of state tables | |
| 27 | 11/24/22 | **No class Thanksgiving day** | |
| 28 | 11/29/22 | State tables interpretation | |
| 29 | 12/01/22 | **Review for the final** **Classes End 12/01/22** | |
| | 12/08/22 | **Final Exam 2** | |

N/A – no performances or presentations