



Don Bosco Technical Institute
Computer Science and Electrical Engineering

Course Syllabus
2022-2023

Course Title: Digital Systems
Course Number: CSEE 223
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Mission Statement: *Guided by the Salesian educational system of St. John Bosco, Don Bosco Technical Institute is a Catholic high school which offers a rigorous college preparatory curriculum—uniquely integrating academics and technology—to qualified young men of all religious, ethnic and socioeconomic backgrounds. As a Christian faith community, the school prepares and equips students to be life-long learners who are dedicated men of faith and integrity committed to leading successful lives of distinguished service and social justice.*

ESLRS: *A Bosco Tech graduate is...*

<i>...Spiritually Aware</i>	<i>...Academically Prepared</i>
<i>...Technologically Distinguished</i>	<i>...An Effective Communicator</i>
<i>...An Emerging Leader</i>	<i>...A Responsible Citizen</i>

Course Description: This is a half semester course spread over 20 weeks duration. This course is an introduction to digital electronics from a “black box” perspective, using standard TTL integrated circuit devices. The course begins with a presentation of binary mathematics, truth tables, AND/OR logic gates, and inverters. Students will be introduced to techniques for digital circuit simplification using Boolean algebra, and Karnaugh mapping. Students will study an important logic configuration, known as a “half-adder”, that is key to providing arithmetic functionality in computers and calculators. Finally, they will explore the applications of various “flip-flop” memory devices, multiplexors, encoders, and decoders. Laboratory experiments support the theory of the course. Some laboratory experiments may be computer simulated on “Multisim”.

Course Materials:

- ☐ Basic scientific calculator (Texas Instruments TI-30Xa)
- ☐ 3 inch – 3 ring binder w/dividers and cover window (CSEE Student Portfolio)
- ☐ Spiral notebook single subject 70 pages (lecture notes)
- ☐ Flash Drive (Multisim)
- ☐ CSEE Tool Kit (CSEE provided)
- ☐ Textbook: Digital Electronics Anil Maini.pdf (digital copy available on google classroom)



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Grading Policy:

<u>Grading Standards</u>		<u>Categories</u>	
A	100 – 90	Test(s)	30% of total grade
B	89 – 80	Quiz(s)	25% of total grade
C	79 - 70	Lab work	25% of total grade
D	69 - 60	Homework	15% of total grade
F	59 and below	Performance	5 % of total grade

1. Homework: Minimum homework assignments shall consist of either of the following¹¹:

- a. Reading Assignments
- b. Instructor handouts.

Laboratory homework assignments shall consist of reading the next experiment and performing all theoretical calculations in advance.

All homework assignments must be completed in PENCIL and submitted on the due dates specified for full credit. Points will be deducted for instructions not being followed.

2. Lab work: Each laboratory experiment shall be completed and submitted for grading. **Instructor at his option will determine which assignments shall require a technical lab report.** Laboratory assignments shall consist of reading the next experiment and performing all theoretical calculations. The laboratory time should be used to build the experiment circuits, conducting the required tests and measurements, and acquiring instructor sign-off via the demonstration of an operational circuit.
All lab work assignments must be completed in PENCIL and submitted on the due dates specified for full credit. Points will be deducted for instructions not being followed.

3. **It is the responsibility of the student to monitor Google Classroom for assignment due dates and Missing Assignments.**

¹¹ Instructor's option to grade the material and change the assignments.



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4. **Late Work:** Late work is accepted under the following conditions.
- A student absent can submit an assignment past the due date only when proof of excused absence is provided (e.g. re-admit slip). Student will be given full credit for the assignment.
 - A student absent on a day of a Quiz or Test can take a makeup only when proof of excused absence is provided (e.g. re-admit slip). **The student assumes responsibility for completing this assignment.**
 - A student submitting an assignment past the due date and after the assignment has been graded and returned to class will have an automatic penalty of **20%** deducted from the full score of the assignment. After that will be a deduction of **10%** for any extra delay.
 - Last date to accept any assignment will be **2 weeks** from the original assigned date. **NO EXCEPTIONS**

Office Hours: Any student who needs extra help should see me during my office hours for extra help. I will be available during the **Second half of lunch** and after school **Tuesdays and Thursdays**

Quizzes: Student will have the right to drop the lowest Quiz score **once every semester (preferably at the end of each semester)**

Extra Credit: There will be extra credit for all students, during the semester and it will be for the exams (Quarter finals and/or Semester finals), 10 to 15 points depending on the Final's score and will be toward the **Final Tests ONLY.**

Objectives: When the students have completed this course of study, they will be able to:

- Be able to convert between the various forms of binary numbering systems and decimal.
- Understand the operation of digital logic gates.
- Be able to use Boolean algebra and Karnaugh maps to express logic operations and simplify logic circuits.
- Understand the operation of various flip-flops.
- Understand the operation of various memory devices, multiplexors, counters, registers, encoders, and decoders.



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Class Expectations:

1. **Attendance and Tardiness:** All students will seat themselves when directed by instructor. Attendance will be taken immediately after the bell. **You will be marked tardy or absent if you are not seated on your assigned chair.**
2. **Classroom Behavior:** Questions and class discussion is encouraged during class as it pertains to course and lecture material. **No talking in the classroom during lecture period.** Discussion and conversations during lab period is to be limited to course and lab work only.
3. **Dress Code:** Review the Parent Student Hand Book an its addendums on the school website. Instructor will conduct routine checks for compliance and issue citations if warranted.
4. **Food:** Absolutely no food or drinking liquids are allowed inside the Technology building at any time unless permission is granted by the instructor. All food and beverages are to be consumed outside the Technology building.
5. **Trash:** Students are required to keep their classroom and lab work area clean, neat, and organized at all times. **Police your individual sitting space.**
6. **Lab Computers:** Use of lab computers is permitted only under the following conditions:
 - a) To complete lab reports.
 - b) To access Multisim for lab assignments.
 - c) To access the CSEE Google drive to access course documents and textbooks.

Students are not allowed to use lab computers for personal use (e.g. surfing, online games, videos, etc.).
7. **Cell Phones, Handheld Electronic Games/Laptop-Notebook Computers/iPads:** Students are forbidden from using their cell phones or any of the above mentioned electronic personal items while in class at any time. Review the Parent Student Handbook. Students are reminded that all the above-mentioned electronic devices are personal property and not the responsibility of the school should they be misplaced or possibly stolen, therefore students are allowed to bring them on campus at their discretion. **Police your personal property.**



Scope and Sequence:

1. Grading Period 1

- a. Digital Electronics
- b. Number Systems
- c. Pulse Wave Characteristics
- d. Decoders and Encoders
- e. 7-segment Displays

2. Grading Period 2

- a. Boolean Algebra
- b. Logic-Boolean Conversions
- c. Logic Gates
- d. Truth Tables
- e. Developing Logic Circuits

3. Grading Period 3

- a. Karnaugh Maps
- b. Boolean-Logic-Karnaugh Conversions
- c. Logic Circuit Simplification
- d. Function of combinational logic
- e. Adder Circuits

4. Grading Period 4

- a. Multivibrator Circuits
- b. Flip-Flops
- c. Shift Registers
- d. Counters
- e. Memory Circuits