

University of Puerto Rico
 Mayagüez Campus
 College of Engineering
 Department of Electrical and Computer Engineering
 Bachelor of Science in Electrical Engineering

Course Syllabus

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| 1. General Information: | |
| Alpha-numeric codification: INEL 4205 Course Title: Logic Circuits Number of credits: Three credit hours Contact Period: Three hours of lecture per week. | |
| 2. Course Description: | |
| English: Boolean algebra, its theorems and postulates. Design of combinational circuits; minimization and reduction techniques, use of medium or large scale integration (MSI/LSI) in digital circuit design; analysis and design of sequential circuits; practical design considerations. Spanish: Algebra Booleana, sus teoremas y postulados. Diseño de circuitos combinatoriales; técnicas de reducción o minimización. Conocimiento del uso de integración mediana o alta, (MSI/LSI) en el diseño de lógica digital; análisis y diseño de circuitos secuenciales y consideraciones prácticas de diseño. | |
| 3. Pre/Co-requisites and other requirements: | |
| Prerequisite: INGE 3016. Co-requisite: INEL 4201. Number systems, general computer concepts, basic circuit theory, semiconductor device characteristics. Basic linear circuit analysis, high-level language programming knowledge | |
| 4. Course Objectives: | |
| This course is designed to introduce students to the analysis and design of combinational and sequential digital systems. The course focuses on the different levels of abstraction present in digital system design and in proven design methodologies. System representation in the form of truth tables, Karnaugh maps, switch diagrams, logic gate diagrams, timing diagrams, transistor diagrams, state diagrams, and block diagrams will be presented. The course will extend beyond MSI and LSI technologies to include programmable devices such as Programmable Logic Arrays (PLAs), Programmable Logic Devices (PLDs), and Field Programmable Gate Arrays (FPGAs). | |
| 5. Instructional Strategies: | |
| <input checked="" type="checkbox"/> conference <input checked="" type="checkbox"/> discussion <input type="checkbox"/> computation <input type="checkbox"/> laboratory <input type="checkbox"/> seminar with formal presentation <input type="checkbox"/> seminar without formal presentation <input type="checkbox"/> workshop <input type="checkbox"/> art workshop <input type="checkbox"/> practice <input type="checkbox"/> trip <input type="checkbox"/> thesis <input checked="" type="checkbox"/> special problems <input type="checkbox"/> tutoring <input type="checkbox"/> research <input type="checkbox"/> other, please specify: | |
| 6. Minimum or Required Resources Available: | |
| 7. Course time frame and thematic outline | |
| Outline | Contact Hours |
| Introduction to digital systems and digital electronics | 2 |

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|---|-----------|
| Number systems and eCodes | 3 |
| Switching algebra, combinational circuit analysis and synthesis | 5 |
| Hardware description languages | 1 |
| Documentation standards and circuit timing | 2 |
| Programmable logic devices | 1 |
| Decoders/encoders, three-state devices, muxes, comparators | 5 |
| Arithmetic circuits (adders, subtractors, multipliers) | 5 |
| Latches and flip-flops | 2 |
| Synchronous state machine analysis and design | 3 |
| Sequential circuit documentation standards and timing | 2 |
| Sequential programmable logic devices | 1 |
| Counters, shift registers, read only memories, static RAM | 8 |
| CPLDs and FPGAs | 2 |
| Exams | 3 |
| Total hours: (equivalent to contact period) | 45 |

8. Grading System

Quantifiable (letters) Not Quantifiable

9. Evaluation Strategies

| | Quantity | Percent |
|--|----------|-------------|
| <input checked="" type="checkbox"/> Exams | 3 | 75 |
| <input checked="" type="checkbox"/> Final Exam | 1 | 25 |
| <input type="checkbox"/> Short Quizzes | | |
| <input type="checkbox"/> Oral Reports | | |
| <input type="checkbox"/> Monographies | | |
| <input type="checkbox"/> Portfolio | | |
| <input type="checkbox"/> Projects | | |
| <input type="checkbox"/> Journals | | |
| <input type="checkbox"/> Other, specify: | | |
| TOTAL: | | 100% |

10. Bibliography:

M. Morris Mano. Digital Design 3rd edition (2002) Prentice Hall.

11. According to Law 51

Students will identify themselves with the Institution and the instructor of the course for purposes of assessment (exams) accommodations. For more information please call the Student with Disabilities Office which is part of the Dean of Students office (Chemistry Building, room 019) at (787)265-3862 or (787)832-4040 extensions 3250 or 3258.

12. Course Outcomes

**Map to
Program
Outcomes**

1. Upon completion of this course the student will be able to describe, specify, analyze, simulate, synthesize, and implement combinational and sequential logic digital systems.

(a)

- (b)
2. Posses a combination of knowledge and analytical, computational and experimental skills necessary to solve practical engineering problems
 - Physical thinking, approximation, and simplification .
 - Thorough knowledge of basic electrical and computer engineering fundamental concepts.
 3. Have adequate communications skills both as an individual and as part of a team. (g)
 - Ability to interpret graphical, numerical, and textual data.
 - Ability to communicate effectively technical information to varied audiences in oral, written and graphical forms, both in English and Spanish.
 - Ability to organize information
 4. Value the importance of lifelong learning.
 - Knowing how to ask questions and that there may be multiple answers. i)

Prepared by: Gladys O. Ducoudray