Course number: 04023240
Course name: Digital Electronics Lab
Prerequisites by course: Digital Electronics, Electric Circuits Lab
Prerequisites by topic: Students are assumed to have had sufficient background of the following topics: multivibrators, op amps, electronic circuits, electric circuits analysis, wiring and debugging.
Credit hours: 1 hour
Contact hours: 3 hours
Textbook: Lab manual
References:

1. K.G. Gopalan, Introduction to digital microelectronic circuits, latest Edition, IRWIN, latest edition
2. Taub and Schilling, Digital Integrated Electronics, McGraw-Hill, latest edition.
3. D. Neaman, Electronic Circuit Analysis and Design, Second Edition, McGraw-Hill, latest edition.
4. R. J. Tocci, Fundamentals Electronics Circuits, of Pulse and Digital Circuits, Prentice-Hall, latest edition.

Course website: ---
Schedule and duration: 16 weeks, 16 Labs, 170 minutes each (including exams).
Minimum student material: class handouts, some instructor keynotes, calculator and access to a personal computer and internet.
Minimum college facilities: digital electronics lab., library, and computational facilities.
Course objectives: The objectives of this course are:

1.	To examine and understand input/output characteristics, voltage transfer characteristics and transistor switching
2.	Become capable to implement threshold, sample and hold, and interfacing devices
3.	Become capable to implement and examine square wave oscillators with adjustable duty cycle andsweep-voltage generators
4.	Become capable to implement Digital to analog and Analog to digital converters and Timers

Course outcomes and relation to ABET student outcomes: (matrix)
Upon successful completion of the course, a student should be able to:

Course Outcomes	Student Outcomes						
	SO1	SO2	SO3	SO4	SO5	SO6	SO7
To examine the input/output characteristics, voltage transfer characteristics, fan-out and propagation delay time of different logic family gates.	*					*	
To examine the characteristics of a Comparator and Schmitt trigger and study some of their applications	*					*	

To examine the characteristics of timing circuits, Monostable and the Astable Multivibrators.	*					*	
To understand the design ofsimple Analog-to-Digital (A/D) and Digital-to-Analog (D/A) converters	*					*	
To examine the characteristics of timing circuits, Monostable and the Astable Multivibrators	*					*	
To be able to design555Timers, adjust output frequency and duty cycle	*					*	
To be able to design oscillators from inverters, interfacing between logic families with different input requirements i.e. TTL & CMOS	*					*	*
To be able to understand and implement Sample and hold circuits, saw tooth wave generator using a pre-designed square wave control signal	*					*	

Course topics:

TTL Logic Specifications
Transistor Switching RTL & DTL Gates
Comparators and Schmitt Trigger
Monostable and Astable Multivibrators
A/D and D/A Converters
IC Timers
Interfacing TTL and CMOS Gates
Oscillators Made From Inverters
Sweep - Voltage Waveforms
Sample-and-Hold Circuit

Computer usage: Pspice and MatLab Software
Attendance: Class attendance will be taken every class and the university's policies will be enforced in this regard.
Assessments: Exams, lab reports
Grading policy:

Reports and student work	20%
Midterm Exam	30%
Final Exam	50%

Instructors:

Student Outcomes (SOs)

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