Meeting:
Lecture: TR 11:00 AM-12:15 PM, BUSA 209
Texas A&M University–Kingsville
College of Engineering
Department of Electrical Engineering and Computer Science

Instructor Information
Dr. Zhaohui Wang
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Scheduled Office Hours:
Monday  2:30 pm -4:30 pm
Tuesday  1:00 pm -4:30 pm
Wednesday  2:30 pm -5:00 pm
Thursday  12:30 pm -1:30 pm, 4:00 pm -5:00 pm or by appointment.
Please feel free to drop by my office any time that my door is open.

Text Book:
It is extremely important that students take good class notes, as the instructor uses materials from numerous sources, not just from the text book or references.
Reference books:

Catalog Description:
EEEN 5333: Principles of VLSI Circuit Design
Principles of design and fabrication of microelectronic circuits via Very Large Scale Integrated circuitry (VLSI), structured design methods for VLSI systems, use of computer-aided design tools, design projects of small to medium scale integrated circuits.

Course Objectives:
This course is designed to develop expertise in designing digital VLSI circuits using computer aided design tools. [Link to outcomes: (a) an ability to apply knowledge of mathematics, science, and engineering; (c) An ability to design a system, component or process to meet desired needs]

Prerequisites by topic:
1) Boolean algebra and digital design
2) Combinational and sequential logic design
3) Electronics
4) Physics of bipolar junction and field effect devices
5) Ability to use one computer-based circuit analysis program

Course Topics:
1) Overview of VLSI design issues
2) Electrical properties of MOS transistors; Depletion and enhancement mode; Threshold voltage; Simple MOSFET fabrication steps
3) Transistor operation; Regions of operation; Trans. Char. equations, current equations; Body effect
4) Pinch off region; Channel length modulation
5) Inverter Characteristics; Channel resistance; Gate capacitance, diffusion capacitance, routing capacitance; Gain ratio
6) Noise margin; Latch up
7) CMOS process technology
8) CMOS process enhancements
9) Switching Characteristic; Fall time, Rise time; Delays; Propagation delay; Empirical delay model; Gate delay approximation; Body effect and delay
10) Delay Analysis for basic gates
11) Basic building blocks of CMOS circuits
12) Performance estimation; Transistor sizing
13) CMOS power dissipation; Transmission gates
14) Wire model; Alternative design techniques (Pseudo nmos, CVSL, etc.)
15) Layout Design, DRC
16) VLSI CAD tools
17) Technology file set up; Scalable layout design; Tapeout and file formats
18) Chip input/output circuits; Pad and power connections
19) Alternative CMOS gates (Dynamic gates, etc.)
20) BiCMOS gate design
21) Design of memory and other programmable devices
22) Testing (observability, controllability, BIST)
23) Project review/testing/debugging
24) Project demonstrations/ presentations

Computer usage:
1) Circuit Simulation with HSPICE, LTSpice
2) Layout design with MAGIC
3) Digital simulation with IRSIM

Grading Procedure:

| Quizzes: Short unannounced tests (to check for reading assignments and attendance) | 5% |
| Homework | 10% |
| Projects: Design, layout and test a modest size CMOS circuit | 20% |
| Exam 1 | 20% |
| Exam 2 | 20% |
| Exam 3 | 25% |

No late assignments and assignments are due at the beginning of the class period. Academic dishonesty will not be tolerated, and could result in a final course grade of F. Attendance is mandatory.

Course Policies:
1) Code of Conduct: As specified in the TAMUK Student Handbook.
2) Attendance: Students are expected to behave in a responsible manner so far as attendance in Lectures is concerned. Valid reasons for absence should be promptly brought to the attention of the Instructor. Regular attendance will favorably affect the decision of the Instructor in a marginal grading case.
3) Make-up Exam, and Early Second Examination: No make-up exam. will be given. Students should discuss their circumstances individually with the instructor.
4) Course Materials: Due to the lack of adequate storage space, exams., reports, and other course material will be retained only till the end of January 2015. After that, they will be sent for recycling.

Disability statement:
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disability. If you believe you have a disability requiring an accommodation please contact the Disability Resource Center (DRC) as early as possible in the term at (361) 593-2904. DRC is located in the Life Service and Wellness building at 1210 Retama Drive.
Six-drop policy:
The following provision does not apply to students with Texas public college or university credits prior to Fall 2007. The Texas Senate Bill 1231 specifies the number of course drops allowed to a student without penalty. After a student has dropped six courses, a grade of OF will normally be recorded for each subsequent drop. Additional information on Senate Bill 1231 is available at the Registrar's Office at (361) 593-2811 and at http://www.tamuk.edu/registrar/droppolicy.html.

Academic misconduct statement:
You are expected to adhere to the highest academic standards of behavior and personal conduct in this course and all other courses. Students who engage in academic misconduct are subject to university disciplinary procedures. Make sure you are familiar with your Student Handbook, especially the section on academic misconduct, which discusses conduct expectations and academic dishonesty rules.

Forms of academic dishonesty:
1) Cheating: Using unauthorized notes or study aids, allowing another party to do one's work/exam and turning in that work/exam as one's own; submitting the same or similar work in more than one course without permission from the course instructors; deception in which a student misrepresents that he/she has mastered information on an academic exercise that he/she has not mastered; giving or receiving aid unauthorized by the instructor on assignments or examinations.
2) Aid of academic dishonesty: Intentionally facilitating any act of academic dishonesty. Tampering with grades or taking part in obtaining or distributing any part of a scheduled test.
3) Fabrication: Falsification or creation of data, research or resources, or altering a graded work without the prior consent of the course instructor.
4) Plagiarism: Portrayal of another's work or ideas as one's own. Examples include unacknowledged quotation and/or paraphrase of someone else's words, ideas, or data as one's own in work submitted for credit. Failure to identify information or essays from the Internet and submitting them as one's own work also constitutes plagiarism.
5) Lying: Deliberate falsification with the intent to deceive in written or verbal form as it applies to an academic submission.
6) Bribery: Providing, offering or taking rewards in exchange for a grade, an assignment, or the aid of academic dishonesty.
7) Threat: An attempt to intimidate a student, staff or faculty member for the purpose of receiving an unearned grade or in an effort to prevent reporting of an Honor Code violation.

Please be aware that the University subscribes to the Turnitin plagiarism detection service. Your paper may be submitted to this service at the discretion of the instructor.

Other Forms of Academic Misconduct:
1) Failure to follow published departmental guidelines, professor's syllabi, and other posted academic policies in place for the orderly and efficient instruction of classes, including laboratories, and use of academic resources or equipment.
2) Unauthorized possession of examinations, reserved library materials, laboratory materials or other course related materials.
3) Failure to follow the instructor or proctor's test-taking instructions, including but not limited to not setting aside notes, books or study guides while the test is in progress, failing to sit in designated locations and/or leaving the classroom/ test site without permission during a test.
4) Prevention of the convening, continuation or orderly conduct of any class, lab or class activity. Engaging in conduct that interferes with or disrupts university teaching, research or class activities such as making loud and distracting noises, repeatedly answering cell phones/text messaging or allowing pagers to beep, exhibiting erratic or irrational behavior, persisting in speaking without being recognized, repeatedly leaving and entering the classroom or test site without authorization, and making physical threats or verbal insults to the faculty member, or other students and staff.
5) Falsification of student transcript or other academic records; or unauthorized access to academic computer records.
6) Nondisclosure or misrepresentation in filling out applications or other university records.
7) Any action which may be deemed as unprofessional or inappropriate in the professional community of the discipline being studied.

Non-academic misconduct:
The university respects the rights of instructors to teach and of students to learn. Maintenance of these rights requires campus conditions that do not impede their exercise. Campus behavior that interferes with these rights will not be tolerated; examples include
1) interfering with the instructor's ability to conduct the class,
2) causing inability of other students to profit from the instructional program, or
3) any interference with the rights of others.

An individual engaging in such disruptive behavior may be subject to disciplinary action. Such incidents will be adjudicated by the Dean of Students under non-academic procedures.

Ongoing behaviors or single behaviors considered distracting (e.g., coming late to class, performing a repetitive act that is annoying, sleeping or reading a newspaper in class, etc.) will be addressed by the faculty member initially either generally or individually. Cases in which such annoying behavior becomes excessive and the student refuses to respond to the faculty member's efforts can be referred to the Dean of Students. In the case of serious disruptive behavior in a classroom the instructor may first request compliance from the student and if it is not received, an instructor has the authority to ask the student to leave the classroom. If the student fails to leave after being directed to do so, assistance may be obtained from other university personnel, including University Police Department. An individual engaging in such disruptive behavior is subject to disciplinary action. Such incidents will be adjudicated by the Dean of Students under non-academic procedures to determine if the student should be allowed to return to the classroom.

**Harassment Discrimination:**

Texas A&M University-Kingsville does not tolerate discrimination on the basis of race, color, religion, national origin, age, disability, genetic information, gender, gender identity or sexual orientation (or any other illegal basis) and will investigate all complaints that indicate sexual harassment, harassment, or discrimination may have occurred. Sexual harassment and sexual assault are types of sex discrimination. Such sexual misconduct is unacceptable and will not be tolerated. Any member of the university community violating this policy will be subject to disciplinary action. A person who believes he/she has been the victim of sexual misconduct harassment, harassment, or discrimination may pursue either the informal or the formal complaint resolution procedure. A complaint may be initially made to the Office of Compliance at (361)-593-4758, complainant's immediate supervisor, a department head, a supervisory employee, or the Dean of Students at (361)-593-3606 or the Office of Compliance at (361)-593-4758. Regardless of who the complaint is filed with, the Compliance Office will be notified of the complaint so it can be investigated.

**THE COURSE OUTLINE IS SUBJECT TO CHANGE.**