SUNY NEW PALTZ
Division of Engineering Programs

EGC320-01 Digital Systems Design (3 credits)
Spring 2017 Semester

1.   General information

Instructor:	**Damu Radhakrishnan**, 204 Resnick Engineering Hall
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Lecture:	T/F	2.00 – 3.15PM, REH111
Office Hours:	F	11.00 - 12.15PM

Textbook: **Fundamentals of Digital Logic with Verilog Design, Stephen Brown & Zvonko Vranesic, McGraw-Hill.** ISBN-13: 978-0073380544 ISBN-10: 0073380547 Edition: 3rd

Reference Books: **Advanced Digital Design with the Verilog HDL,** Michael D. Ciletti**,** Prentice-Hall, 2011
Digital Systems Design Using VERILOG, Charles H. Roth, Lizy Kurian John and Byeong Kil Lee, Cengage Learning, 2016.

Prerequisites: Digital Logic Fundamentals (EGC220)

Level of the Course: The course is designed for junior or senior undergraduates.

2.   **COURSE DESCRIPTION (as it appears in the current catalog)**

State minimization, assignment, and design of synchronous sequential circuits. Verilog coding. Analysis and design of asynchronous sequential circuits. PLDS. Digital system design examples. Additional topics such as design of CMOS circuits, power reduction, testing etc.

3.   STUDENT LEARNING OUTCOMES

Students will demonstrate their ability to:
  I.   analyze CMOS circuits and advanced synchronous and asynchronous digital systems.

II.   design of CMOS circuits and Verilog-HDL based digital systems involving Verilog coding, simulation, and implementation using programmable logic devices (FPGA's). These design activities culminate in a course design project and the corresponding project report.

4.   ABET OUTCOMES

a) An ability to apply knowledge of mathematics, science, and engineering.
b) An ability to design and conduct experiments, as well as to analyze and interpret data.
c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.
d) An ability to function on multidisciplinary teams.
e) An ability to identify, formulate and solve engineering problems.
f) An understanding of professional and ethical responsibility.
g) An ability to communicate effectively.
h) The broad education necessary to understand the impact of engineering solutions in a global, economical and societal context.
i) A recognition of the need for, and an ability to engage in lifelong learning.
j) A knowledge of contemporary issues.
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Mapping between the ABET Program Outcomes and this Course

Student outcome	Course learning outcome	Level of contribution 3/3 = strong; 2/3 = moderate; 1/3 = marginal
a) An ability to apply knowledge of mathematics, science and engineering	I, II	3/3
e) An ability to identify, formulate and solve engineering problems	II	3/3

* ABET: Accreditation Board for Engineering and Technology

Tentative list of Topics:

1. Review of combinational logic circuits, sequential circuit elements (Decoders, MUX, Comparator, adder, Latches, Flip-flops, registers etc)- (Chapters 4 & 5)

2. Verilog Coding (Ch 4.6, 5.12, 5.13, 6,7, Appendix A, and Class handout)

3. Analysis and design of synchronous sequential Circuits (Ch 6)

4. Analysis and design of asynchronous sequential Circuits (Ch 9, Journal/conference articles, class handout)

5. Design of CMOS circuits (Appendix B, Class handout)

6. Programmable logic devices - Simple programmable logic devices SPLDs), Complex programmable logic devices (CPLDs), Field-programmable gate arrays (FPGA) (Appendix B)

7. Digital system design examples (Ch 7)

8. Additional topics as time permits (Arithmetic circuits, Testing logic circuits, memory, ...) (Ch 7, Appendix B)

Design Project Due: Tuesday May 9, 2017
Final Exam: 12.30-2.30 on Tuesday May 16, 2017

GRADING

Homework	20%
Project	20%
2 Midterm Exams	30%
Quiz	10%
Final Exam	20%
Total	100%

Total (%)	**Final Grade**
90-100	A
85-89	A-
80-84	B+
75-79	B
70-74	B-
65-69	C+
60-64	C
55-59	C-
Below 55	F

COURSE RULES AND GENERAL COMMENTS

- Examinations are closed book, and closed notes.
- Homework assignments are given on a weekly basis; the due date is one week from the distribution date (unless otherwise specified). **No late homework solutions will be accepted except under extreme non-academic conditions with the prior approval of the instructor.**
- Any disputed grade must be resolved within 7 days of the return of the graded item. Please check with the teaching assistant first and then with the instructor if needed.
- You are responsible for all the course materials and lecture contents unless specified otherwise. If you miss a class, it is your responsibility to obtain assignments and other information given on that day.
- All your course work (homework, quiz and exams) is expected to be your own. Evidence indicating copying of work or other cooperation will be dealt with based on the University academic conduct rules. General instructions such as assisting in problem interpretation, and giving occasional hints on problem attack (i.e., the kind of help you would get from the instructor), however, are permitted. On the other hand, you are encouraged to form informal study groups to solve homework problems.
- If you have questions on course materials, the instructor will be available for consultation.
- Save your graded homework and tests. You may need to bring them in case of any grade discrepancy.
- **Regular class attendance is very important and attendance will be taken at the beginning of each lecture. A 5% bonus will be credited for those who attend classes regularly, and do not miss more than 2 lecture sessions during the whole semester. No bonus credit will be given otherwise. Those who come to the lecture more than 5 minutes late will be marked as absent. If you come late within the permitted 5 minute time period, it is your responsibility to make sure that your attendance is recorded properly.**

Please pay attention to the following requirements regarding your homework assignment

- Always use standard size (8½ × 11) paper. Do not use torn-off paper from spiral bound notebooks (max penalty 10%)
- Write the course #, homework #, and your name on top of the first page, as shown below (max penalty 10%)

Course #   Homework #   Your Name
- Write clearly, neatly and in an orderly fashion (max penalty 10%)
- Draw circuit diagrams (max penalty 10%)
- Show all the steps involved in getting to the final answer, no credit may be given for the work not shown.
- Box-in your final answers.
- **Staple all homework pages together before you turn them in** (max penalty 10%)

Campus-wide Policy Statements

1. Academic integrity policy statement: *Students are expected to maintain the highest standards of honesty in their college work. Cheating, forgery, and plagiarism are serious offenses, and students found guilty of any form of academic dishonesty are subject to disciplinary action. New Paltz's policy on academic integrity is found at http://www.newpaltz.edu/ugc/policies/policies_integrity.html, and several excellent resources to help with avoiding plagiarism are available on the Sojourner Truth Library's website: http://lib.newpaltz.edu/assistance/plag.html.*

2. Reasonable accommodation of individuals with disabilities statement: *Students needing classroom and/or testing accommodations related to a disability should contact the Disability Resource Center (Student Union, Room 210, 845-257-3020) as close as possible to the beginning of the semester. The DRC will then provide students' instructors with an Accommodation Memo verifying the need for accommodations. Specific questions about services and accommodations may be directed to Deanna Knapp, Assistant Director (knappd@newpaltz.edu).*

3. Veteran and Military Services statement: *New Paltz's Office of Veteran and Military Services (OVMS) is committed to serving the needs of veterans, service members and their dependents during their transition from military life to student life. Student veterans, service members or their dependents who need assistance while attending SUNY New Paltz may refer to www.newpaltz.edu/veterans; call 845-257-3120, -3124 or -3074; or stop by the Student Union, Room 100 South.*

4. Computer and network policies statement: *Users of New Paltz's computer resources and network facilities are required to comply with the institutional policies outlined in the Acceptable Uses and Privacy Policy (https://sites.newpaltz.edu/csc/policies/acceptable-uses-and-privacy-policy/).*

5. Identity verification policy statement for online courses: *New Paltz's Online Identity Verification Policy is designed to verify that students enrolled in our online courses and/or programs are the ones who take the courses, complete the programs, and receive the academic credit. See http://www.newpaltz.edu/ugc/policies/policies_onlineverification.html for the complete policy.*

Information on electronic SEIs, which students are encouraged to complete.

You are responsible for completing the Student Evaluation of Instruction (SEI) for this course. I value your feedback and use it to improve my teaching and planning. Please complete the online form during the period [April 26-May10, 2017].

Important dates

Last day to withdraw from a course (undergraduates) without receiving a penalty grade**: March 31, 2017**.