Division of Engineering Programs
EGC220 Digital Logic Fundamentals
(3 credits*)
Fall 2019 Semester

Instructor: Dr. Baback Izadi, 213 Resnick Engineering Hall
                          Voicemail: (845) 257-3823, Fax: (845) 257-3730
                          bai@engr.newpaltz.edu
                          http://www.engr.newpaltz.edu/~bai

Course web page: http://www.engr.newpaltz.edu/~bai/EGC220/EGC220_fall.html
Lecture: Monday and Thursday   11:00 AM – 12:15 PM, WH221

Office Hours: Monday and Thursday   2:00 PM – 3:30 PM
                          Tuesday   11:00 AM – 12:00 PM
                          In person or via skype: baback.izadi
                          And by appointment

Prerequisites: MAT251 Calculus I
Corequisites: EGC221 Digital Logic Lab

Course catalog description: An introduction to digital logic analysis and design. Topics include: number representations used in today's digital systems and their arithmetic properties and conversion techniques; combinational switching theory of digital element networks where no feedback is present; analysis and design of clocked sequential circuits where feedback is present; and an introduction to modern programmable logic devices and their programming and synthesis techniques.

Course learning outcomes:
   I.   Students will learn to demonstrate their ability to analyze, synthesize, and design networks of combinatorial digital logic elements, and digital clocked sequential circuits.

This course contributes to the student outcomes as specified in the following table:

Student Outcome	Learning Outcome	Level of Contribution 3/3 = strong; 2/3 = moderate; 1/3 = marginal
1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	I	2/3

*Credit hours assigned reflect both classroom instruction time and expected outside preparation/study time and must comply with SUNY's credit hour policy. Verification of compliance is a component of Middle States' reaccreditation review.

Course Structure:

The course is setup in as a blended or a hybrid format. Therefore, it <u>requires that</u>, before coming to each lecture session,

1. you have a printed copy of the PowerPoint lecture notes for that session,
2. <u>you have watched</u> the assigned lecture videos in Blackboard (under Content) and have made appropriate notes on your lecture notes,
3. you have read the assigned textbook chapter and have attempt the assigned problems.

The purpose of the lecture sessions is to discuss issues, answer questions, and solve problems. At the end of each lecture, you will take a quiz. Without following the outlined steps, it is unlikely you will benefit from the lecture session and, very likely, will get a low quiz grade.

Textbook:

"*Digital Design*," online textbook by ZyBooks. Every student is required to subscribe within the first week. The book will be used partially to assign homework.

1. Sign in or create an account at learn.zybooks.com
2. Enter zyBook code **NEWPALTZEGC220IzadiFall2019**
3. Subscribe

A subscription is **$58**. Students may begin subscribing on Aug 12, 2019 and the cutoff to subscribe is Dec 08, 2019. Subscriptions will last until Jan 07, 2020.

References:

♦ *"Logic and Computer Design Fundamentals,"* 4th Edition, by M. Mano and C. Kime, Prentice Hall, Upper Saddle River, NJ, 2008
♦ *"Digital Design"* 3rd Edition by J. F. Wakerly, Prentice Hall, Upper Saddle River, NJ, 2000.
♦ "*Digital Principles,*" 3rd Ed, Roger L. Tokheim, Schaum's Outline Series, McGraw-Hill Publ, 1994 [contains many worked out examples]

Grading:

ZyBook assignment	40 Points
Homework	60 Points
Quizes*	200 Points
2-tests	200 Points
Final	100 Points
Total	600 Points

Total Point	Final Grade
540-600	A
528-539	A-
511-527	B+
480 – 510	B
465-479	B-
449-464	C+
420-448	C
406-419	C-
360 – 405	D
Below 360	F

The table to the right indicates the maximum points for the indicated grade. Some adjustment will likely be made depending on the class average.

*The lowest 5 quiz grades will be dropped. This includes any missed quiz for even legitimate absences, i.e. illness, religious days, black solidarity. Hence, there will not be any makeup quiz.

Course Content:

Lecture Date	Lecture Note in Course Website	Lecture Video on *Blackboard*	Required Additional Activities
8/26/2019	Overview & Class policy		
8/29/2019	1-Number systems	Lectures 1 & 2	Read text Chaper 1, Try Problems 1
9/5/2019	1-Number systems	Lectures 3 & 4	Read text Chaper 1, Try Problems 2
9/9/2019	1-Number systems	Lectures 5 &6	Read text Chaper 1, Try Problems 3
9/12/2019	2 - Boolean Logic	Lectures 7 & 8	Read text Chapter 2, see sample operations, Try Problem 4
9/16/2019	3 - Boolean Logic Functions	Lectures 9 & 10	Read text Chapter 2, Try Problem 5
9/19/2019	3 - Boolean Logic Functions	Lectures 11 & 12	Read text Chapter 2, Try Problem 6
9/23/2019	3 – All NAND Implementation	Lectures 13 & 14	Read text Chapter 2,Try Problem 7
9/26/2019	4-Simplification Using K-Map	Lectures 15 & 16	Read Text Chapter 3,Try Problem 8
9/30/2019	4-Simplification Using K-Map	Lectures 17 & 18	Read Text Chapter 3,Try Problem 9
10/3/2019	5-Design of Combinational Circuits	Lectures 19 & 20	Read Text Chapter 3,Try Problem 10
10/7/2019	**Test 1**		Practice Problems
10/10/2019	5-Design of Combinational Circuits	Lectures 21& 22	Read Text Chapter 3, Try Problem 11
10/17/2019	Design of Decoders	Lectures 23 & 24	Read Text Chapter 3, Try Problem 12
10/21/2019	Design of Encoder / Mux/ DeMux	Lectures 25 & 26	Read Text Chapter 3, Try Problem 13
10/24/2019	6- Programmable Logic Devices	Lectures 27 & 28	Try Problem 14
10/28/2019	7- Design Using Verilog	Lectures 29 & 30	Read Text Chapter 4, Try Problem 15
10/31/2019	7- Design Using Verilog 8- Latches	Lectures 31 & 32	Read Text Chapter 5, Try Problem 16
11/4/2019	8- Flip-flops and Ripple Counters	Lectures 33 & 34	Read text Chaper 5 & Try Problem 17
11/7/2019	8- Asynchronous and Synchronous Circuits	Lectures 35 & 36	Read text Chaper 5 & Try Problem 18
11/11/2019	8- Analysis of Sequential Circuits	Lectures 37 & 38	Read text Chaper 5 & Try Problem 19
11/14/2019	**Test 2**		Practice Problems
11/18/2019	8- Design of Sequential Circuits	Lectures 39 & 40	Read Text Chapter 5, Try Problem 20
11/21/2019	8- Sequential Circuits		Read Text Chapter 5, Try Problem 20
11/25/2019	8- Verilog in Sequential Circuits	Lectures 41 & 42	Read Text Chapter 5, Try Problem 21
12/2/2019	8- Design of Finite State Machine	Lectures 43 & 44	Try Problem 22
12/5/2019	8- Design of a Controller	Lectures 45	Read Text Chapter 5, Try Problem 23
12/9/2019	**Review**		
12/19/2019	**Final Exam**		10:15 AM – 12:15 PM

*Exam Dates will be confirmed a week before

Rules and general comments:

♦ Each examination and its format will be announced one week prior. Should an exam schedule conflict occur, you should bring it to the instructor's attention as soon as possible? Once you begin an exam, no makeup or other score adjustments will be permitted. Please note the date and time of the final exam and do not schedule any event that will not permit you to take the final at that time.

♦ Homework assignments will be posted on the course web site. The due date is one week from the distribution date (unless otherwise specified). No late homework set is accepted except under extreme non-academic condition and with the prior approval of the instructor.

♦ I strongly advise against missing any classes. If you miss a class, it is your responsibility to obtain assignments and other information given on that day. If you are not in class within the first 10 minutes, you will be considered absent. Three missing classes are allowed. You would lose 2% of your grade if you miss a fourth class and 5% after the seventh absence.

♦ Common courtesy is expected in class. Please turn off your cell phone or put it on silent mode while in class.

♦ All your coursework (homework, project, and exams) is expected to be your own – See **Academic integrity policy statement** below.

♦ Please seek help before serious difficulties in your understanding of course material arise. In particular, it is much better to get your questions answered before an exam than after! There are multiple resources for help and tutoring. In addition to using my office hours, you may reach out to tutoring sessions provided by Eta Kappa Nu, Electrical and Computer Engineering Honor Society. In addition, you may utilize the resources of Center for Students Success: http://hawksites.newpaltz.edu/css/about-us/

♦ Please make sure you save your graded homework, test, and report. I may ask for them in case of any grading discrepancy.

Please pay attention to the following requirements regarding your homework assignments:

- Always use standard size (8½ × 11) paper. Do not use papers torn-off from spiral bound notebooks. (maximum penalty 10%)
- Write the course #, homework set #, and your name on top of the first page, as shown below: (maximum penalty 10%)
   Course #   Homework set #   Your first name Your last name
- Write clearly, neatly, and in an orderly fashion.   (maximum penalty 10%)
- Draw schematics and circuit diagrams when applicable. (Maximum penalty 20%)
- Show steps involved getting to the final answer, no credit may be given for the work not shown.
- Box-in your final answers.   (Maximum penalty 10%)
- Staple all homework pages together before you turn them in.   (Maximum 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 violations of academic integrity. Students found guilty of any violation of academic integrity are subject to disciplinary action, up to and including expulsion. New Paltz's policy on academic integrity (rev. October 2017) is found in the Undergraduate Catalog. Sojourner Truth Library's website contains several excellent resources to help with avoiding plagiarism; see especially lib.newpaltz.edu/assistance/plag.html.

✓ All your coursework (homework, project, and exams) is expected to be your own. If you are caught cheating on any assignment, you will get an "F" for the course and you will be reported to the university. General instructions such as assisting in problem interpretation, and giving of occasional hints on problem attack (i.e., the kind of help you would get from the instructor or a teaching assistant in the course!), however, are permitted.

✓ During the exam, you may not borrow any item from your classmates i.e. calculator, pens, erasers. Moreover, you may not talk with your classmates. Doing so can result in a failed grade for the exam or the course.

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) or Jean Vizvary, Director (vizvaryj@newpaltz.edu).

3. Veteran & Military Services statement: New Paltz's Office of Veteran & 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 OVMS's website; call 845-257-3120, -3124 or -3074; e-mail np-vms@newpaltz.edu; 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 and other technology policies, available at www.newpaltz.edu/itpolicy.

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. The complete policy is published in the Undergraduate Catalog.

6. Title IX and related policy statement: Gender discrimination, sexual harassment, sexual assault, sexual violence, stalking, and power-imbalanced sexual/romantic relationships between faculty and students are strictly prohibited within the SUNY New Paltz community. We encourage students to report, confidentially discuss, or raise

questions and concerns regarding potential violations. Reports can be made to the Title IX Office, the department chair and/or the dean of your school. For information on Title IX reporting and support, visit www.newpaltz.edu/titleix/. The College's Consensual Relationship Policy can be found at www.newpaltz.edu/hr/policies.html.

Special dates:

September 2	No class (Labor Day)
Oct 14 - 15	No Class (Fall Break)
October 14	Mid-Point of Fall semester
October 30	Last day for course withdrawal
November 27 – 29	No classes (Thanksgiving Break)
November 25 - December 9	SEI Administration
December 9	Last day of class
December 19	Final Exam, 10:15 PM – 12:15 PM