**Spring 2018**

**ESE 218: Digital Systems Design**  
**Instructor:** Dmitri Donetski  
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**Office Hours:** Tuesday, Thursday, 3-5 PM, room 247 Light Eng. bldg.

**Prerequisites:** Engineering Major: PHY 127 or 132 or 142, or ESE 124; Computer Science Major: CSE 220

**Description:** The course covers binary numbers, Boolean algebra, arithmetic circuits, flip-flops, analysis and design of sequential circuits, memory and programmable logic. Circuits are designed and simulated in Active-HDL (Aldec), assembled on a breadboard and verified/debugged with a pattern generator/logic analyzer.

**Goal:** Learning basic theory and development of practical skills for taking next level ECE courses.

**Outcomes:** students will develop 1) understanding fundamentals of analysis and design of standard building blocks and systems; 2) skills in reading schematic of digital circuits and analysis of circuit behavior; 3) skills in design of combination and sequential circuits using conventional methods and CAD tools; 4) skills in verification and troubleshooting circuits with the pattern generator and logic analyzers, determination of signal propagation delays.

**Lectures:** 101 Javitz, Tuesday, Thursday, 5:30-6:50 PM

**Labs:** Room 235 Heavy Eng. bldg (new addition). Lab attendance (experiments) start from the 3rd week.  
Section 1, Monday, 12:55-3:55 PM  
Section 2, Monday, 7:00-10:00 PM  
Section 3, Tuesday, 7:00-10:00 PM


**Laptop:** A laptop operating under Windows is required for simulation assignments (prelabs). Prelab reports are due by midnight before the lab session (submitted by e-mail). Final lab reports are due at the beginning of the next week lab session. Final lab reports have to be printed.

**Grading:** Lab reports (33 %), Homeworks (11 %), Test 1 (10 %), Test 2 (15 %), Final exam (25 %), Portfolio (6 %)

For passing the course all prelab reports (simulations) from individual students and all final lab reports from a team of 2 students have to be submitted, attendance of all lab sessions is required.

**Topical outline:**  
Binary numbers and codes: 5 %  
Boolean algebra, logic transformation and minimization: 20 %  
Arithmetic circuits, decoders, multiplexers, latches and flip-flops: 25 %. Analysis and design of sequential circuits: 30 %  
Memory and programmable logic: 20 %

**References:**