Course : **EC 362 Computer Architecture**

Professor : Associate Professor Ryan N. Rakvic

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Office Hours : appointment – just email rakvic@usna.edu

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Text : *Computer Organization and Design: The Hardware/Software Interface*. 4th edition, David A. Patterson and John L. Hennessy, Morgan-Kaufmann (Elsevier), 2009.

Software : pcspim; Altera Quartus II

Prerequisites : EC262 (Digital Systems)

Description : This course covers organization, structure, and design of computers. Design topics include: performance metrics; complex and reduced instruction set design; data addressing; design of central processing units, registers, and arithmetic logic units; circuits to handle interrupts and other exceptions; horizontal and vertical microprogramming; pipeline and superscalar design; cache and memory system design; input/output system design; data busses; multiprocessors. A study of computer arithmetic covers two's complement addition and subtraction; algorithms for signed multiplication; IEEE floating-point formats.

Objective : EC362 is a required course for students majoring in computer engineering; it is an elective for students majoring in electrical engineering. Its purpose is to give you an initial exposure to the design of digital computers, from the design of a computer instruction set to its implementation in hardware.

Schedule :

Topics	Weeks
Hardware/software interface; ISA; performance metrics/fallacies	1
MIPS core; MIPS examples	2
Number systems & conversions; Combinational logic	1.5
Adders/subtractors; Multipliers; ALU design	1.5
Single cycle datapath & hardwired control	2
Multiple cycle datapath & microprogrammed control	2
Handling OS exceptions	.5
Pipelining: datapath & control	1
Advanced pipelining: hazards & stalls; superscalar	1
Cache memory	1.5
Busses, I/O, Multiprocessors	1

Grades : Homework = 5%
Labs = 15%
Quizzes 10%
Exams = 45%
Final exam = 25%
Class participation = X%

I determine nominal grades using the weightings shown above. However, I reserve the right to alter course letter grades up or down based on your class participation, performance trends, and my overall impression of your performance.

Policies : All assignments are due at the beginning of class on the due date. Late assignments will **not** be accepted unless prior approval is granted by the instructor.

Collaboration is NOT permitted on exams and quizzes. Collaboration / teamwork on homework assignments is permitted and encouraged. All assignments must list the names of all collaborators in that group.

Please don't hesitate to make an appointment (by phone or email) for EI.

In class decorum: no food, no sleeping. Observe proper military courtesies and customs at all times.