**CS 301-1: Computer Organization.**

**College of Arts and Sciences Syllabus.**

**Course Information**

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| Credit Hours: | 3 |
| Course Description: | Representation of data, machine arithmetic, processor and memory organizations, instruction execution, assembly and machine languages, addressing mechanisms, and implementation of high level language constructs. Students will gain a vision of levels of abstraction in hardware and software, the nature of the Von Nuemann machine and the nature of high level languages. |
| Prerequisites: | [CS-200](http://catalog.neiu.edu/search/?P=CS-200) minimum grade of C and [CS-201](http://catalog.neiu.edu/search/?P=CS-201) minimum grade of C. |
| Meeting Day/Time: | Tuesdays and Thursdays from 12:15pm – 1:30pm. |
| Meeting Room: | BBH 219 |

**Faculty Information**

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| Instructor: | P. Prezas | |
| Office Location: | LWH 3052 | |
| Office Hours: | Mondays: | 5:00pm-5:40pm |
| Tuesdays: | 1:30pm-4:15pm |
| Wednesdays: | 5:00pm-5:40pm |
| Thursdays: | 1:30pm-4:15pm |
| Fridays: | 5:00pm-6:00pm |
| Phone: | 773-442-4725 | |
| E-mail: | pprezas@neiu.edu | |

**Textbook**

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| Mano Morris “Digital Design”, Prentice Hall, Upper Saddle River, New Jersey, 2007. |

**Additional Resource Materials**

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| 1 | Carpinelli J. “Computer Systems Organization & Architecture”, Addison Wesley, Boston, MA, 2001. |
| 2 | Tanenbaum A. “Structured Computer Organization”, Prentice Hall, Upper Saddle River, 2006. |
| 3 | Stallings W. “Computer Organization & Architecture”, Prentice Hall, Upper Saddle River, New Jersey, 2015. |
| 4 | Class notes. |

**Course Objectives / Student Learning Outcomes**

Upon successful completion of this course, students will be able to:

- Understand the basic blocks of a computer system.

- Understand the design and operation of the basic components of a computer block.

- Understand the relationship between hardware and software.

- Understand how the instructions/ programs are executed.

- Understand the relationship between machine language, assembly language and high level language.

- Understand the processor and memory organizations.

- To program in assembly an 8-bit processors.

**Student Tasks / Assignments / Requirements**

*Course Outline*

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| 1 | Introduction. |
| 2 | Binary Numbers. |
| 3 | Octal and Hexadecimal Numbers. |
| 4 | Signed Binary Numbers. |
| 5 | Boolean Algebra. |
| 6 | Canonical and Standard Forms. |
| 7 | Simplification Methods. |
| 8 | Karnaugh Maps. |
| 9 | Basic Computer Building Blocks: Logic Gates, Tri State Buffers. |
| 10 | Combinational Circuits: Adders, Encoders, Decoders, Multiplexers. |
| 11 | Sequential Circuits: Excitation Tables, Design of Registers and Counters. |
| 12 | A Primitive Computer: Input and Output Ports, Bus Organization, ALU, Instruction Set, States, Timing Diagram, Machine Code Programming. |
| 13 | A Microprocessor: Addressing Modes, Instruction Set, Arithmetic Operations, Logical Operations, Program Counter, Memory Address Register, Instruction Register, Sequencer, Flags, Stack, Stack Pointer - Interrupts, Assembly Language Programming. |
| 14 | Advanced Computer Architectures, Multi-Core CPUs, Digital Signal Processors. |
| 15 | Simulation of logic gates, flip-flops, counters, registers and sequencer using “Logisim”. |
| 16 | Intel 8085 Microprocessor: Instruction set, Simulator. |

*Course Schedule*

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| --- | --- | --- |
| *Wk* | *Date* | *Tentative Topics\** |
| 1 | 08/25 | Introduction to CS301. |
| 2 | 08/30 | Binary numbers. |
| 3 | 09/01 | Octal and Hex numbers. |
| 4 | 09/06 | Octal and Hex numbers. |
| 5 | 09/08 | Signed number arithmetic. |
| 6 | 09/13 | Signed number arithmetic. |
| 7 | 09/15 | Boolean algebra and logic functions. |
| 8 | 09/20 | Boolean algebra and logic functions. |
| 9 | 09/22 | **Exam 1** |
| 10 | 09/27 | Minimization techniques, Karnaugh maps. |
| 11 | 09/29 | Minimization techniques, Karnaugh maps. |
| 12 | 10/04 | Use of simulator for logic functions. |
| 13 | 10/06 | Combinational circuits. |
| 14 | 10/13 | Combinational circuits. |
| 15 | 10/18 | Sequential circuits. |
| 16 | 10/20 | Sequential circuits. |
| 27 | 10/25 | **Exam 2** |
| 18 | 10/27 | Design of a primitive computer. The role of the sequencer. |
| 19 | 11/01 | Design of a primitive computer. The role of the sequencer. |
| 20 | 11/03 | Adding more functions to the primitive design. |
| 21 | 11/08 | Adding more functions to the primitive design. |
| 22 | 11/10 | Intel 8085 architecture. |
| 23 | 11/15 | Intel 8085 architecture. |
| 24 | 11/17 | Programming 8085. |
| 25 | 11/22 | Programming 8085. |
| 26 | 11/29 | **Exam 3** |

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| 27 | 12/01 | Unsigned Number Multiplication Algorithm. |
| 28 | 12/06 | Booth’s Algorithm. |
| 29 | 12/08 | Restoring Division Algorithm. |
| 30 | 12/13 | **Exam 4** |
| 31 | 12/15 | Project review. |

\*The topics from week to week may not follow the schedule precisely but the exam dates are firm.

*Other Important Dates*

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| --- | --- |
| 1/08 | Last day to drop with 100% refund. |
| 1/25 | Last day to drop with 90% refund. |
| 2/08 | Last day to drop with 50% refund. |
| 3/08 | Last day to drop with 25% refund. |
| 3/26 | A “W” is assigned. |
| 4/01 | Last day to drop. |

*Grading*

Grades will be determined based upon each student’s performance on homework assignments, quizzes,

and exams weighted as follows:

Homework 0%

Quizzes 10%

Exam 1 45%

Exam 2 45%

Total 100%

*Homework Assignments* (0%)

Throughout the semester, problems and designs will be assigned as homework. The due date for each

homework assignment will be the following week. The purpose of the homework is to provide the student with an opportunity to practice on the material that has been presented in class. Homework will not be graded.

*Quizzes* (10%)

At the beginning of each class meeting will be a short quiz similar to the homework problems. Quizzes will be open paper notes and open book. No access to any digital devices allowed.

*Exams* (90%)

There will be two in-class exams, each worth 45% of your course grade. The material for every exam is the material in the period before the exam only.

Exams are open-book and open-notes. Access to any digital devices is prohibited.

Grade Scale

85-100% A

70-84% B

60-69% C

50-59% D

0-49% F

**Course Policies**

*Homework Group Work Policy*

Working in groups on homework assignments is strongly recommended. Your quiz and exam scores account for your grade will rely on your individual abilities.

*Makeup Exam Policy*

If you cannot attend an exam because of religious reasons or because of a previously scheduled conflict

of a serious nature, you must send me an email by **October 1st** telling me the date and the reason

you cannot attend in order to be eligible for a makeup exam. *There are no makeups for missed.*

*Quizzes.*

If you miss an quiz due to a medical emergency, you must provide adequate documentation from your

doctor in order to be eligible for a makeup quiz.

*Extra Credit Policy*

There will be no extra credit given.

*Absence Policy*

Attendance will be taken but not count as a direct percentage towards your grade.

**University Statements**

*Academic Integrity Statement*

By enrolling in this course, you are bound by the NEIU Student Code of Conduct:

http://www.neiu.edu/university-life/student-rights-and-responsibilities/student-code-conduct. You will be

informed by your instructor of any additional policy specific to your course regarding plagiarism, class

disruptions, etc.

*Campus Safety Statement*

It is recognized that a safe university environment is a shared responsibility of faculty, staff, and students,

all of whom are expected to familiarize themselves with and cooperate with emergency procedures.

Emergency Procedures and Safety Information can be found on NEIU*port* on the MyNEIU tab or at:

http://homepages.neiu.edu/~neiutemp/Emergency\_Procedures/MainCampus/

*ADA Statement*

Northeastern Illinois University (NEIU) complies with the Americans with Disabilities Act (ADA) in making

reasonable accommodations for qualified students with disabilities. To request accommodations, students

with special needs should make arrangements with the Student Disability Services (SDS) office, located

on the main campus in room D104. Contact SDS via (773) 442-4595 or http://www.neiu.edu/universitylife/

student-disability-services.

*Campus Safety*

Web links to Campus Safety: Emergency Procedures and Safety Information can be found on NEIUport on the MyNEIU tab or as follows: <http://homepages.neiu.edu/~neiutemp/Emergency_Procedures/MainCampus/>.