Syllabus

605.204: Computer Organization

Instructor Contact

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Students can check to see if I am on Zoom. You are welcome to try to connect if I am on. If I am in a class, there should be a password so you will not connect to the class. If I cannot talk, I will tell you and we will schedule a time.

If this is not urgent, or I am not on zoom, I prefer that students contact me via email. Please be sure to include course number in the subject line. I will make every effort to respond to your inquiry within 48 hours or earlier. If an issue is urgent, you can call me.

Course Lecture and Office Hours via Zoom

This course will use Zoom to facilitate weekly, synchronous cource lecture and office hours. Lectures will be recorded for those who miss the lecture, and to allow students to replay parts of the lecture they need reenforcement on. Before the lecture each week students will be provided with a link and password for the zoom lecture for that week. Office hours are open, and will be Thursday night from 7-9. I am free most days, so if I am on zoom you can connect, or email me and I will log on.

For more information regarding Zoom, please see the Zoom Student Quick Start Guide.

Course Description

This course examines the question: "How does a computer work?". It provides the student with an understanding of the hardware/software interface by studying the design and operation of the basic components of computer systems and gives hands-on experience in programming the machine at the assembly language level to expose its internal functionality. In addition, the student will obtain an understanding of the machine representation of programs and data as well as the influence of the underlying hardware system on the design of systems software such as assemblers, linker/loaders, compilers and operating system services. NOTE: Not for Graduate credit.

Prerequisites

No prerequisites are required by the school, but at least one semester of programming (in any language) is strongly advised.

Course Goals

At the conclusion of this course, with practical experience garnered from judicious homework and programming assignments, students will be able describe the layers that exist when running a program, including assembly language, machine code, and then how the machine

code is instantiated onto a working computational machine. in taking a program from a high level language, such as C/C++ or Java, and explaining each of these layers students come to realize that a computer is just a mechanistic machine. Also by understanding these layers and what is happening at each layer students are able to understand how bugs and security problems are introduced into programs through a lack of understanding of the boundaries of each of these layers.

Course Objectives

By the end of the course, you will be able to:

- Understand that a computer is a machine by fully exposing how the machine work.
- Understand the computer as a layered system.
- Explain the internal representation of data and information.
- Explain the recursive paradigm through non-trivial programming assignments and assess practical applications of recursion.
- Provide a basic understanding of assembly language programming

Course Structure

This class consists of a 2 hour 40 minute synchronous lecture each week, and weekly homework assignments. If possible students should attend the lecture, but lectures will be recorded for students who cannot attend for any reason.

This course is Blackboard enhanced. All notes and other materials will be provided on Blackboard. All assignments will be given in Blackboard and should be submitted in Blackboard.

The course materials are divided into sections which will correspond to the various layers of the computer architecture. See the course schedule and course modules for more information.

Textbook

Required

No textbook is required. All materials for this class are free and readily available.

Optional

None

Required Software

Students will be required to download and install a number of free software packages. These will be listed in the course moduels.

Technical Requirements

You should refer to **Help & Support** on the left menu for a general listing of all the course technical requirements.

Student Coursework Requirements

It is expected that each week students will spend about 3 hours in lecture, and approximately 4–7 hours to complete the homework.. Here is an approximate breakdown: reading the assigned sections of the texts (approximately 3–4 hours per week) as well as some outside reading, listening to the audio annotated slide presentations (approximately 2–3 hours per week), and writing assignments (approximately 2–3 hours per week).

This course will consist of the following basic student requirements:

Preparation and Participation (10% of Final Grade Calculation)

I will post some discussion questions in the classroom as I find interesting topics. Please post a thoughtful insight into these topics. Thoughtfull responses will earn points.

Assignments (60% of Final Grade Calculation)

Assignments will include a mix of qualitative assignments (e.g. literature reviews, model summaries), quantitative problem sets, and case study updates. Include a cover sheet with your name and assignment identifier. Also include your name and a page number indicator (i.e., page x of y) on each page of your submissions. Each problem should have the problem statement, assumptions, computations, and conclusions/discussion delineated. All Figures and Tables should be captioned and labeled appropriately.

All assignments are due according to the dates in the Calendar.

Late submissions will be reduced by one letter grade for each week late (no exceptions without prior coordination with the instructors).

If, after submitting a written assignment you are not satisfied with the grade received, you are encouraged to redo the assignment and resubmit it. If the resubmission results in a better grade, that grade will be substituted for the previous grade.

Qualitative assignments are evaluated by the following grading elements:

1. Each part of question is answered (20%)
1. Writing quality and technical accuracy (30%) (Writing is expected to meet or exceed accepted graduate-level English and scholarship standards. That is, all assignments will be graded on grammar and style as well as content.)
2. Rationale for answer is provided (20%)
3. Examples are included to illustrate rationale (15%) (If you do not have direct experience related to a particular question, then you are to provide analogies versus examples.)
4. Outside references are included (15%)

Qualitative assignments are graded as follows:

- 100–90 = A—All parts of question are addressed; Writing Quality/ Rationale/ Examples/ Outside References [rich in content; full of thought, insight, and analysis].
- 89–80 = B—All parts of the question are addressed; Writing Quality/ Rationale/ Examples/ Outside References [substantial information; thought, insight, and analysis has taken place].
- 79–70=C—Majority of parts of the question are addressed; Writing Quality/ Rationale/ Examples/ Outside References [generally competent; information is thin and commonplace].
- <70=F—Some parts of the question are addressed; Writing Quality/ Rationale/ Examples/ Outside References [rudimentary and superficial; no analysis or insight displayed].

Quantitative assignments are evaluated by the following grading elements:

1. Each part of question is answered (20%)

2. Assumptions are clearly stated (20%)
3. Intermediate derivations and calculations are provided (25%)
4. Answer is technically correct and is clearly indicated (25%)
5. Answer precision and units are appropriate (10%)

Quantitative assignments are graded as follows:

- 100–90 = A—All parts of question are addressed; All assumptions are clearly stated; All intermediate derivations and calculations are provided; Answer is technically correct and is clearly indicated; Answer precision and units are appropriate.
- 89–80 = B—All parts of question are addressed; All assumptions are clearly stated; Some intermediate derivations and calculations are provided; Answer is technically correct and is indicated; Answer precision and units are appropriate.
- 79–70=C—Most parts of question are addressed; Assumptions are partially stated; Few intermediate derivations and calculations are provided; Answer is not technically correct but is indicated; Answer precision and units are indicated but inappropriate.
- <70=F—Some parts of the question are addressed; Assumptions are not stated; Intermediate derivations and calculations are not provided; The answer is incorrect or missing; The answer precision and units are inappropriate or missing.

Exams (30% of Final Grade Calculation, combined from 10% for Midterm and 15% for Final)

The midterm exam will be available in Module 6 and the final exam will be available in the next-to-last Module. You will have one week to complete the exams and they will be due by 5PM exactly one week from their release. You may use the course text to complete the exams.

The exams are evaluated by the following grading elements:

1. Each part of question is answered (20%)
2. Writing quality and technical accuracy (30%) (Writing is expected to meet or exceed accepted graduate-level English and scholarship standards. That is, all assignments will be graded on grammar and style as well as content.)
3. Rationale for answer is provided (20%)
4. Examples are included to illustrate rationale (15%) (If a student does not have direct experience related to a particular question, then the student is to provide analogies versus examples.)
5. Outside references are included (15%)

Exams are graded as follows:

- 100–90 = A—All parts of question are addressed; Writing Quality/ Rationale/ Examples/ Outside References [rich in content; full of thought, insight, and analysis].
- 89–80 = B—All parts of the question are addressed; Writing Quality/ Rationale/ Examples/ Outside References [substantial information; thought, insight, and analysis has taken place].
- 79–70 = C—Majority of parts of the question are addressed; Writing Quality/ Rationale/ Examples/ Outside References [generally competent; information is thin and commonplace].
- <70 = F—Some parts of the question are addressed; Writing Quality/ Rationale/ Examples/ Outside References [rudimentary and superficial; no analysis or insight displayed].

Grading

Assignments are due according to the dates posted in your Blackboard course site. You may check these due dates in the Course Calendar or the Assignments in the corresponding modules. I will post grades one week after assignment due dates.

I will accept late work, but for a penalty of my choosing. I generally do not directly grade spelling and grammar. However, egregious violations of the rules of the English language will be noted without comment. Consistently poor performance in either spelling or grammar is taken as an indication of poor written communication ability that may detract from your grade.

A grade of A indicates achievement of consistent excellence and distinction throughout the course—that is, conspicuous excellence in all aspects of assignments and discussion in every week.

A grade of B indicates work that meets all course requirements on a level appropriate for graduate academic work. These criteria apply to both undergraduates and graduate students taking the course.

EP uses a +/- grading system (see "Grading System", *Graduate Programs* catalog, p. 10).

100-98 = A+ (hard limit, 97.9 doesn't cut it)
97-94 = A
93-90 = A−
89-87 = B+
86-83 = B
82-80 = B−
79-77 = C+
76-73 = C
72-70 = C−
69-67 = D+
66-63 = D
<63 = F

Final grades will be determined by the following weighting:

Item	% of Grade
Preparation and Participation	10%
Assignments	60%
Final Exam	30

Help & Support

You should refer to **Help & Support** on the left menu for a listing of all the student services and support available.

Academic Integrity

Academic Misconduct Policy

All students are required to read, know, and comply with the Johns Hopkins University Krieger School of Arts and Sciences (KSAS) / Whiting School of Engineering (WSE) Procedures for Handling Allegations of Misconduct by Full-Time and Part-Time Graduate Students.

This policy prohibits academic misconduct, including but not limited to the following: cheating or facilitating cheating; plagiarism; reuse of assignments; unauthorized collaboration; alteration of graded assignments; and unfair competition. You may request a paper copy of this policy at this by contacting jhep@jhu.edu.

Policy on Disability Services

Johns Hopkins University (JHU) is committed to creating a welcoming and inclusive environment for students, faculty, staff and visitors with disabilities. The University does not discriminate on the basis of race, color, sex,

religion, sexual orientation, national or ethnic origin, age, disability or veteran status in any student program or activity, or with regard to admission or employment. JHU works to ensure that students, employees and visitors with disabilities have equal access to university programs, facilities, technology and websites.

Under Section 504 of the Rehabilitation Act of 1973, the Americans with Disabilities Act (ADA) of 1990 and the ADA Amendments Act of 2008, a person is considered to have a disability if c (1) he or she has a physical or mental impairment that substantially limits one or more major life activities (such as hearing, seeing, speaking, breathing, performing manual tasks, walking, caring for oneself, learning, or concentrating); (2) has a record of having such an impairment; or (3) is regarded as having such an impairment class. The University provides reasonable and appropriate accommodations to students and employees with disabilities. In most cases, JHU will require documentation of the disability and the need for the specific requested accommodation.

The Disability Services program within the Office of Institutional Equity oversees the coordination of reasonable accommodations for students and employees with disabilities, and serves as the central point of contact for information on physical and programmatic access at the University. More information on this policy may be found at the Disabilities Services website or by contacting (410) 516-8075.

Disability Services

Johns Hopkins Engineering for Professionals is committed to providing reasonable and appropriate accommodations to students with disabilities.

Students requiring accommodations are encouraged to contact Disability Services at least four weeks before the start of the academic term or as soon as possible. Although requests can be made at any time, students should understand that there may be a delay of up to two weeks for implementation depending on the nature of the accommodations requested.

Requesting Accommodation

New students must submit a Disability Services Graduate Registration Form along with supporting documentation from a qualified diagnostician that:

- Identifies the type of disability
- Describes the current level of functioning in an academic setting
- Lists recommended accommodations

Questions about disability resources and requests for accommodation at Johns Hopkins Engineering for Professionals should be directed to:

EP Disability Services
Phone: 410-516-2306
Fax: 410-579-8049
E-mail: ep-disability-svcs@jhu.edu