

Intro Computer Architecture

Computer Science

2023 Fall

**Instructor Information**

Instructor: Dr. Amin Safaei

Office Location: AT5024

E-mail: asafaei@lakeheadu.ca

Office Hours: **Monday and Wednesday** at 12:00 pm to 1:30 pm (by email appointment)

**Teaching Assistant (TA) Information**:

TBA

**Course Identification**

COMP-2453-FA

Course Name: Intro Computer Architecture

Course Location: AT1007

Class Times: **Monday** - **Wednesday** 4:00PM - 5:30PM

Prerequisites: N/A

**Course Description/Overview**

Digital logic. Digital systems. Machine-level representation of data. Major component parts of a modern digital computer, namely, control unit, arithmetic and logic units, memory units and peripheral interfaces are studied.

**Course Learning Objectives**

By the end of this course, students will be able to:

* Represent numbers in decimal, binary, and hexadecimal systems and perform arithmetic operations in those systems;
* Define fixed-point and floating-point binary numbers;
* Explain the building blocks of computers;
* Describe how various components of modern computers function;
* Design and implement programs in assembly language;
* Describe the fundamental principles of the central processing unit and control unit design;
* Explain how the central processing unit and other components exchange information;
* Describe the complexity and speed of various architectural components and;
* Describe hardware and system software techniques for input and output device interfacing.

**Course Resources**

Course Website(s)

* myCourseLink

Required Course Text(s)

* There is no required textbook for this course. The instructor will provide the students with class notes, slides, and other study materials.

Additional text

* Computer Organization and Design by Patterson and Hennessy, the 4th

Software environment

* All the software used in this course is either open source or available in the computer labs.
* See D2L for the details.

**Take-Home Assignments:**

* There will be three assignments in this term that must submit through d2l (Courselink).
* **Sending assignments to instructor email or TAs will not evaluate and receive 0.**
* **Late submission is not accepted.**

**Assignments and Evaluations**

|  |  |
| --- | --- |
| * Assignment: (10+10+10) | 30% |
| * Mid-term exam (Closed book) | 25% |
| * Final exam (Closed book) | 35% |
| * Pop Quizzes | 10% |

**Attendance:**

* Regular attendance at lectures as well as active participation in classroom discussions is an important factor for student success. The successful student must develop good note-taking skills and be willing to ask questions.
* The submission of pop quizzes will contribute 10% to the final grade.

**Course Schedule/Outline**

|  |  |  |  |
| --- | --- | --- | --- |
| **Week** | **Description** | **Date** | |
| **Monday** | **Wednesday** |
| 1 | Computer Abstractions and Technology |  | SEP 6, 2022 |
| 2 | Instructions: Language of the Computer – Part 1 | SEP 11, 2022 | SEP 13, 2022 |
| 3 | Instructions: Language of the Computer – Part 2 | SEP 18, 2022 | SEP 20, 2022 |
| 4 | Fundamentals of Digital Logic Design – Part 1 | SEP 25, 2022 | SEP 27, 2022 |
| 5 | Fundamentals of Digital Logic Design – Part 2 | OCT 2, 2022 | OCT 4, 2022 |
| 6 | Study Break | OCT 9, 2022 | OCT 11, 2022 |
| 7 | Midterm Exam | OCT 16, 2022 | OCT 18, 2022 |
| 8 | Computer Arithmetic | OCT 23, 2022 | OCT 25, 2022 |
| 9 | Designing a Processor – Part 1 | OCT 30, 2022 | NOV 1, 2022 |
| 10 | Designing a Processor – Part 2 | NOV 6, 2022 | NOV 8, 2022 |
| 11 | The Memory Hierarchy | NOV 13, 2022 | NOV 15, 2022 |
| 12 | Storage and I/O | NOV 20, 2022 | NOV 29, 2022 |
| 13 | Parallel Processors | NOV 27, 2022 | DEC 22, 2022 |
| 14 | Review and Problem Solving | DEC 4, 2022 |  |

**Course Policies**

* behavioral standards (this could be a reference to the [Student Code of Conduct - Academic Integrity](https://www.lakeheadu.ca/students/student-life/student-conduct/academic-integrity/node/51239))
* attendance,
* safety regulations (e.g. completion of WHMIS training for lab work, PPE, etc.)
* netiquette (e.g. set guidelines about how students should communicate with you including hours of availability, reasonable response time, subject headings, salutation, etc.),

**Academic Integrity Statement (**Exam/Assignment Integrity)**:**

I understand and agree that:

(1) Unless otherwise allowed by the course instructor, I must complete the assignments in this course without the assistance of anyone else.

(2) Unless otherwise allowed by the course instructor, I must not access any sources or materials (in print, online, or in any other way) to complete any course exam.

I further understand and agree that, if I violate either of these two rules, or if I provide any false or misleading information about my completion of course assignments or exams, I may be prosecuted under the Lakehead University Student Code of Conduct – Academic Integrity, which requires students to act ethically and with integrity in academic matters and to demonstrate behaviours that support the University’s academic values.

**Copyright**

Students should be aware that all instructional, reference, and administrative materials prepared for this course are protected in their entirety by copyright. Students are expected to comply with this copyright by only accessing and using the course materials for personal educational use related to the course, and that the materials cannot be shared in any way, without the written authorization of the course instructor. If this copyright is infringed in anyway, students may be prosecuted under the Lakehead University Student Code of Conduct – Academic Integrity, which requires students to act ethically and with integrity in academic matters and to demonstrate behaviours that support the University’s academic values.

**Copyright Compliance (D2L):**

I understand and agree that all instructional, reference, and administrative materials to which I am given access in this course (the "course materials"), whether they consist of text, still or kinetic images, or sound, whether they are in digital or hard copy formats, and in whatever media they are offered, are protected in their entirety by copyright, and that to comply with this copyright and the law

(1) I may access and download the course materials only for my own personal and non-commercial use for this course; and

(2) I am not permitted to download, copy, or store (in any medium) any text, image, or sound component of the course materials for any other purpose whatsoever, or to forward or share, transmit, broadcast, show, post or play in public, adapt, or change in any way any text, image, or sound component of the course materials, except as expressly authorized, and only to the extent authorized, in writing, by the course instructor."

I further understand and agree that, if I infringe the copyright of the course materials in any way, I may be prosecuted under the Lakehead University Student Code of Conduct – Academic Integrity, which requires students to act ethically and with integrity in academic matters and to demonstrate behaviours that support the University’s academic values.

**Regulations**

It is the responsibility of each student registered at Lakehead University to be familiar with, and comply with all the terms, requirements, regulations, policies and conditions in the Lakehead University [Academic Calendar](http://navigator.lakeheadu.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=25&chapterid=6999&loaduseredits=False). This includes, but is not limited to, Academic Program Requirements, Academic Schedule of Dates, University and Faculty/School Policies and Regulations and the Fees and Refund Policies and Schedules (Lakehead University Regulations webpage, 2020-21).

**Academic Integrity**

A breach of Academic Integrity is a serious offence. The principle of Academic Integrity, particularly of doing one’s own work, documenting properly (including use of quotation marks, appropriate paraphrasing and referencing/citation), collaborating appropriately, and avoiding misrepresentation, is a core principle in university study. Students should view the [Student Code of Conduct - Academic Integrity](https://www.lakeheadu.ca/students/student-life/student-conduct/academic-integrity/node/51239) for a full description of academic offences, procedures when Academic Integrity breaches are suspected and sanctions for breaches of Academic Integrity.

**Supports for Students** – there are many resources available to support students. These include but are not limited to:

* [Health and Wellness](https://www.lakeheadu.ca/current-students/student-health-and-counselling-centre)
* [Student Success Centre](https://www.lakeheadu.ca/current-students/student-success-centre)
* [Student Accessibility Centre](https://www.lakeheadu.ca/current-students/student-services/accessibility/)
* [Library](https://library.lakeheadu.ca/)
* [Lakehead International](https://www.lakeheadu.ca/international)
* [Indigenous Initiatives](https://www.lakeheadu.ca/indigenous)

Lakehead University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities and/or medical conditions to ensure they have an equitable opportunity to participate in all of their academic activities. If you are a student with a disability and think you may need accommodations, you are strongly encouraged to contact Student Accessibility Services (SAS) and register as early as possible. For more information, please contact [Student Accessibility Services](http://studentaccessibility.lakeheadu.ca/)  (SC0003, 343-8047 or [sas@lakeheadu.ca](mailto:sas@lakeheadu.ca))