The Ministry of Education of the Azerbaijan Republic

The State Oil Company of the Azerbaijan Republic

Baku Higher Oil School

Department of Information Technology

C Programming Language

Syllabus, Fall 2024

**Instructor**: Azar Aliyev

Course Code: XXXX

Instruction Language: English

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# Course Description:

This course provides a comprehensive introduction to the C programming language, equipping students with the fundamental skills and knowledge needed to develop efficient and robust software applications. C is a versatile and powerful language used in various domains, including system programming, embedded systems, and application development. Through hands-on programming exercises and projects, students will gain proficiency in C programming, understand its principles, and be prepared for more advanced programming challenges.

# Course Objectives:

* To introduce students to the fundamental concepts of programming using the C language.
* To teach students how to write efficient and well-structured C code.
* To provide hands-on experience in solving real-world problems through C programming.
* To prepare students for advanced topics in computer science and software development.
* To foster critical thinking and problem-solving skills through programming challenges.

# Learning Outcomes:

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

* Demonstrate a solid understanding of the basic syntax, data types, and control structures in the C programming language.
* Write C programs that are efficient, readable, and maintainable.
* Debug and troubleshoot C code effectively, identifying and resolving common programming errors.
* Utilize pointers and memory management techniques to work with data structures and dynamic memory allocation.
* Create modular and reusable code through the use of functions and libraries.
* Develop basic command-line applications and interact with external files.
* Apply knowledge of C programming to solve real-world problems, including mathematical calculations, data manipulation, and simple algorithmic tasks.
* Explore and practice good programming practices and coding standards.
* Collaborate effectively in a team environment, using version control systems for code management.
* Prepare for advanced courses in computer science, software engineering, and system programming, with a strong foundation in C programming.

# Prerequisites:

No prior programming experience is required, but basic familiarity with computer operations and concepts is recommended. Students should have access to a computer with a C compiler installed for hands-on programming assignments.

# Grading:

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| **Type** | **Grade** |
| Homework | 20% |
| Project 1 | 10% |
| Project 2 | 10% |
| Project 3 | 20% |
| Final exam | 40% |

There will be maximum of 3 projects throughout the course duration. The topics and the dates will be announced later. Students will have to form a group of three for each project.

# Syllabus

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| Week | Topic |
| 1 | Introduction. Writing, compiling, and debugging C programs. Hello world. |
| 2 | Variables and datatypes, operators. |
| 3 | Control flow. Functions and modular programming. Variable scope. Static and global variables. |
| 4 | More control flow. Input and output. |
| 5 | Pointers and memory addressing. Arrays and pointer arithmetic. Strings. Searching and sorting algorithms. |
| 6 | User-defined datatypes, structs, unions, bitfields. Memory allocation. Linked lists, binary trees. |
| 7 | Pointers to pointers, pointer and string arrays, multidimensional arrays. Stacks and queues. |
| 8 | Void and function pointers. Hash tables. |
| 9 | External libraries. B-trees, priority queues. |
| 10 | C standard library: stdio.h, ctype.h, stdlib.h, assert.h, stdarg.h, time.h |
| 11 | Dynamic memory allocation, malloc and valgrind, garbage collection. |
| 12 | Multithreading and concurrency. |