

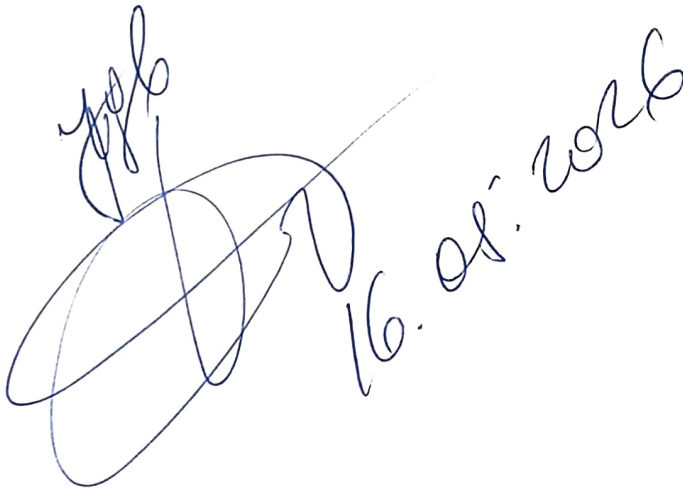
Penza State University
Faculty of Computer Engineering
Department of Computer Engineering

EXPLANATORY NOTE

for course design for the course

Programming

on the topic calculator in c

A large, stylized handwritten signature in blue ink, followed by the date "16.02.2026" written in a similar style.

Completed: Ouail Lotfi
student of group 24vvial

Accepted:

A handwritten signature in blue ink, likely of the person accepting the work.

Penza 2026

Penza State University

Faculty of Computer Engineering

Department of Computer Engineering

"APPROVE"

Head of the Department of Computer Engineering


_____ M.A. Mitrokhin

« ____ » _____ 2026 y.

EXERCISE

for course design for the course

Programming

Student: Ouail Lotfi _____ Group: 24VVIa1

Project topic: ***Development of a program using algorithms and data structures***

Initial data (technical requirements) for design

Application name: Calculator using stack

Task: The program must implement 10 basic arithmetic and logical operations. The program works with float and integer data. Data width: 16 and 32 bits. Data and operations must be processed using a stack. The number of stacks is specified and justified by the developer.

Mandatory requirements for the program:

1. Multimodularity.
2. Using complex data types of structures, files.
3. The video system operating mode is a text.
4. Input device: keyboard, mouse.
5. The user interface should be built on the basis of menus.
6. Availability of a screensaver.
7. MS Windows operating system.
8. C programming language.
9. Software development environment - Microsoft Visual Studio.

Scope of work for the course

1. Calculation part

Program development.

2. Graphic part

Data diagram, system resource diagram, system operation diagram, program hierarchical structure, program interaction diagram.

3. Experimental part

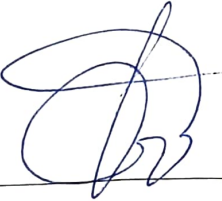
Debugging the program.

Project completion time by section

According to schedule

The assignment issuance date is _____, _____.

Project defense date " ____ " _____

Manager  Fedjunin R.N.

Received the task " ____ " 

Student : Ouail Lotfi

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Introduction

The goal of this coursework is to create a Calculator program and gain practical skills in developing applications using the C programming language and Microsoft Visual Studio 2022 development environment.

The calculator allows users to perform basic arithmetic operations such as addition, subtraction, multiplication, and division. The program provides a simple and user-friendly interface and ensures accurate and efficient calculations.

1. Statement of the problem

It is required to develop a calculator application that performs basic arithmetic operations.

The calculator must:

1. Perform addition, subtraction, multiplication, and division.
2. Support integer and floating-point numbers.
3. Handle division by zero errors.
4. Allow repeated calculations in one session.
5. Provide a user-friendly menu interface.
6. Validate incorrect user input.
7. Be modular (use separate files/modules).

The program must be controlled using keyboard input.

Conclusion

In this project, a modular calculator program was successfully developed using the C programming language. The main objective was to design and implement a calculator capable of handling arithmetic expressions written in infix notation, converting them into postfix notation using the Shunting Yard algorithm, and evaluating the result using a stack-based approach.

During the development process, important programming concepts were applied, including modular programming, stack data structures, and expression parsing algorithms. The program was divided into multiple modules such as the main module, stack module, and calculator module, which improved code organization, readability, and maintainability.

The implementation of the Shunting Yard algorithm allowed correct handling of operator precedence and parentheses, ensuring accurate conversion from infix to postfix notation. The postfix evaluation algorithm provided an efficient and reliable way to compute the final result.

This project helped strengthen understanding of fundamental data structures, algorithm design, and modular software development in C. It also demonstrated how complex problems such as expression evaluation can be solved efficiently using stacks.

In the future, the calculator can be further improved by adding support for prefix notation, floating-point numbers, error handling, and a graphical user interface. Overall, the project achieved its objectives and provided valuable practical experience in programming and algorithm implementation.

List of sources used

1. CyberForum.ru. – URL: CyberForum, a forum for programmers and system administrators.
2. Wikipedia – The Free Encyclopedia. – URL: Wikipedia, information resource for algorithms and data structures.
3. Lecture materials and laboratory instructions for the course “Programming”.