

Penza State University
Faculty of Computer Engineering
Department of Computer Engineering

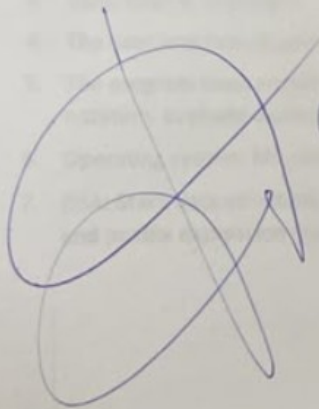
EXPLANATORY NOTE

for course design for the course

Programming

on the topic

CALCULATOR IN C

 Ouail
15.10.2026

Completed: Ouail Lotfi
student of group: 24VVIA1

Accepted:

Penza 2026

APPROVED

Head Department of VT

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« 2024 year

THE TASK LIST

for the course task

Logic and basic of algorithmization in engineering problems

Student Ouail Lotfi, Group 24VVIA1

Project topic: Development of a Calculator Program Using Stack Data Structure .

Initial data (technical requirements) for design Develop a console-based calculator program for evaluating mathematical expressions using the stack data structure.

Mandatory program requirements:

1. IDE: Microsoft Visual Studio.
2. Programming language: C.
3. Input device: Keyboard.
4. The user interface should be console-based (CLI).
5. The program must accept mathematical expressions, convert infix expressions into postfix notation, evaluate expressions, and display the results.
6. Operating system: Microsoft Windows.
7. DSA: Stack data structure, infix-to-postfix conversion using the Shunting Yard algorithm, and postfix expression evaluation.

Scope of work for the course**Algorithmic part**

- Study the stack data structure and its operations.
- Develop an algorithm for converting infix expressions into postfix notation.
- Develop an algorithm for evaluating postfix expressions.
- Implement the calculator program in C.

■ The grafical part

- Program flowchart.
- System operation diagram.
- Hierarchical structure of the program.
- Program interaction diagram.
- Diagram illustrating stack operations and expression evaluation.

Experimental part

- Compile and run the program.
- Test arithmetic operations and operator precedence.
- Test expressions containing parentheses and decimal numbers.
- Debug the program and verify the correctness of the results.

Project completion time by section

According to schedule.

The date of issue of the task is "October 14", 2026.

Project defense date " " _____

Teacher Fediunin R.N. _____

Received the task on Oct 14, 2026.

Student Ouail Lotfi. _____

Content

Introduction.....	3
1. Statement of the problem.....	4
2. Choosing a solution.....	5
3. Description of program development.....	6
4. Debugging and testing.....	8
5. Program Description.....	8
6. User manual.....	9
Conclusion.....	11
List of sources used.....	13
Appendix A.....	14
Program Listings.....	14

Conclusion

As a result of this course project, a simple calculator program was developed using the C programming language. The program can process arithmetic expressions containing addition, subtraction, multiplication, division, and exponentiation. It also supports parentheses, decimal numbers, and negative values.

The developed solution uses a stack to process mathematical expressions. The entered infix expression is converted into postfix notation and then evaluated. This approach allows the program to correctly consider operator precedence and the order of calculations.

During the development and testing stages, different arithmetic expressions and incorrect inputs were checked. The program can detect invalid expressions and division by zero and display an appropriate error message. It also allows the user to perform several calculations in one session and exit using Q or q.

The project helped demonstrate practical use of C programming concepts such as functions, arrays, structures, loops, conditional statements, string processing, and the stack data structure. The final program provides a simple and functional console calculator that meets the main requirements of the project.

List of sources used

1. Kernighan, B. W., Ritchie, D. M. The C Programming Language. 2nd Edition. Prentice Hall, 1988.
2. Microsoft Learn. C language documentation. Microsoft.
<https://learn.microsoft.com/en-us/cpp/c-language/>
3. cppreference.com. C language reference.
<https://en.cppreference.com/w/c.html>