



COURSE SYLLABUS

CSC10002 – ADVANCED PROGRAMMING TECHNIQUES AND PRACTICES

1. GENERAL INFORMATION

Course name:	Advanced Programming Techniques and Practices
Course name (in Vietnamese):	Kỹ thuật lập trình
Course ID:	CSC10002
Knowledge block:	Basic Professional Knowledge
Number of credits:	4
Credit hours for theory:	45
Credit hours for practice:	30
Credit hours for self-study:	90
Prerequisite:	None
Prior-course:	Introduction to Programming
Instructors:	Lê Thanh Tùng

2. COURSE DESCRIPTION

The course is designed to provide students with advanced programming techniques and practices in C/C++ programming language. Students will learn how to use different types of pointers, dynamic memory management, binary file manipulation, etc. Recursion concept and its applications are mentioned in depth. Students will learn how to implement basic data structures such as linked list, stack, and queue. Sort algorithms and problem solving with dynamic programming will also be presented.

3. COURSE GOALS

At the end of the course, students are able to

ID	Description	Program LOs
G1	Describe and use advanced programming techniques in C/C++.	1.2.1
G2	Define and apply recursion concepts in programming.	1.2.1, 1.3.1
G3	Describe and implement basic data structures in C/C++.	1.2.1, 1.3.1
G4	Explain and use sort algorithms and dynamic programming in solving programming problems.	1.2.1, 1.3.1
G5	Explain and present programming concepts in English.	2.4.3, 2.4.5
G6	Demonstrate team-work and presentation skills.	2.2.1, 2.2.2, 2.3.2

4. COURSE OUTCOMES

CO	Description	I/T/U
G1.1	Describe and use different types of pointers in C/C++.	I, T
G1.2	Apply C/C++ pointers to manage dynamic array and string.	U
G1.3	Describe and manipulate binary files in C/C++.	I, T, U
G2.1	Define and use recursion concepts in programming.	I, T
G2.2	Apply recursion techniques to solve programming problems.	U
G3.1	Describe and implement singly linked list.	I, T, U
G3.2	Describe and implement stack and queue.	I, T, U
G4.1	Describe and implement basic sort algorithms.	I, T
G4.2	Explain and apply dynamic programming in solving problem.	I, T, U
G5.1	Explain and present programming concepts in English.	U
G6.1	Demonstrate team-work and presentation skills.	U

5. TEACHING PLAN

ID	Topic	Course outcomes	Teaching/Learning Activities (samples)
1	Programming Review	G5.1, G6.1	Case-study and discussion HW1
2	Pointer	G1.1, G5.1	Lecturing, Demonstration QZ1, HW2
3	Advanced Pointer	G1.2, G5.1	Lecturing, Demonstration QZ2, HW3
4	Binary File	G1.3, G5.1	Lecturing, Demonstration QZ3, HW4
5	Binary File Applications	G1.3, G6.1	Lecturing, Demonstration, Case-study and discussion HW5
6	Recursion	G2.1, G5.1	Lecturing, Demonstration QZ4, HW6
7	Recursion Applications	G2.2, G6.1	Lecturing, Demonstration, Case-study and discussion HW7
8	Linked List	G3.1, G5.1	Lecturing, Demonstration QZ5, HW8
9	Stack and Queue	G3.2, G6.1	Lecturing, Group discussion HW9
10	Sorting and Dynamic Programming	G4.1, G4.2, G6.1	Lecturing, Demonstration, Group discussion HW10

11	Final Review	G1.2, G1.3, G2.2, G3.1, G4.1, G4.2, G6.1	Q&A, Group discussion
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For the practical laboratory work, there are 10 weeks which cover similar topics as it goes in the theory class. Each week, teaching assistants will explain and demonstrate key ideas on the corresponding topic and ask students to do their lab exercises either on computer in the lab or at home. All the lab work submitted will be graded. There would be a final exam for lab work.

6. ASSESSMENTS

ID	Topic	Description	Course outcomes	Ratio (%)
A1	Assignments			40%
A11	Homework: HW1-HW10	Homework are programming problems assigned at the end of each session, do at home and submit online.	G1.1, G1.2, G1.3, G2.1, G2.2, G3.1, G4.2	10%
A12	Lab-work: LW1-LW10	Lab-work are programming problems presented and guided during lab session.	G1.1, G1.2, G1.3, G2.1, G2.2, G3.1, G3.2, G4.1, G4.2	20%
A13	Quiz: QZ1-QZ5	Quiz are quick test at the beginning of each session.	G1.1, G1.2, G1.3, G2.1, G3.1	10%
A2	Exams			60%

A21	Lab midterm exam	In-class programming exam on computer		10%
A22	Lab final exam	In-class programming exam on computer		10%
A23	Midterm exam	Closed book exam. Describe the understanding of different topics, analyze & program to solve problems		20%
A24	Final exam	Closed book exam. Describe the understanding of different topics, analyze & program to solve problems		20%

7. RESOURCES

Textbooks

- K.N. King, C Programming: A Modern Approach, 2th Edition, Norton & Company, 2008.
- Kỹ thuật lập trình, Trần Đan Thư, Nguyễn Thanh Phương, Đinh Bá Tiến, Trần Minh Triết, NXB Khoa Học Kỹ thuật, 2011.

Others

- Adam Drozdek, Data Structures and Algorithms in C++, 4th Edition, Cengage Learning, 2008.
- The C Programming Language, 2th Edition, Brian W. Kernighan, Dennis M. Ritchie, Prentice Hall, 1988.
- C Programming, Wikibooks, http://en.wikibooks.org/wiki/C_Programming

8. GENERAL REGULATIONS & POLICIES

- All students are responsible for reading and following strictly the regulations and policies of the school and university.



- Students who are absent for more than 3 theory sessions are not allowed to take the final exam.
- For any kind of cheating and plagiarism, students will be graded 0 for the course. The incident is then submitted to the school and university for further review.
- Students are encouraged to form study groups to discuss on the topics. However, individual work must be done and submitted on your own.