

SYLLABUS

COURSE: PROGRAMMING TECHNIQUES AND PRACTICES

1. General information

- Course name: Programming techniques and practices.
- Website: <https://courses.ctda.hcmus.edu.vn>, Moodle, course Kỹ thuật lập trình, lecturer Nguyễn Minh Huy.
- Lecturer information:
 - M.S. Nguyễn Minh Huy, Software Engineering Department, Faculty of Information Technology, University of Science, HCMC.
 - Email: nmhuy@fit.hcmus.edu.vn, subject: [Student Id]-[Course name]-[Title].
 - Office hour: room I82, Software Engineering Dept, 227 Nguyễn Văn Cừ (email).

2. Course description

This course is to introduce to students advanced programming techniques and practices in C/C++ syntax. Students will learn how to use different types of pointers, dynamic memory management, binary file manipulation, etc. Students will also learn to implement basic data structures such as linked list, stack, and queue. Sort algorithms and problem solving with dynamic programming will also presented.

3. Course objectives

At the end of this course, students are able to do the followings:

- **Define** and **use** advance programming techniques in C/C++: pointers, binary files, recursion, exception handling, etc.
- **Describe** and **implement** basic data structures: linked list, stack, and queue.
- **Present** and **apply** basic sort algorithms and dynamic programming to solve problems.

4. Course grades



	Theory	70%	Practice	30%
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Progression	20%	Theory assignments	10%	Lab assignments	10%
Midterm	30%	Quiz, Exercises + Midterm	20%	Lab midterm	10%
Final	50%	Final exam	40%	Lab final exam	10%
Bonus	10%	1% each (for student who is active in class, discussions, assignments ...)			

5. Course policies

- Students walk-through slides and read textbook before each theory session.
- Students do individual assignments after each theory session.
- Any kinds of cheating and plagiarism in this course receive FAILED grade.
- Violation of submission rules (deadline, naming convention, ...) receives PENALTY grade.
- In emergency situations, course syllabus is subject to change without notice.

6. Textbook and references

No.	Book	Information
1		K.N. King, C Programming: A Modern Approach, 2 th Edition, W. W. Norton & Company, 2008.
2		Adam Drozdek, Data Structures and Algorithms in C++, 4th Edition, Cengage Learning, 2008.
3		Kỹ thuật lập trình, Trần Đan Thư, Nguyễn Thanh Phương,

		Đinh Bá Tiến, Trần Minh Triết, NXB Khoa Học Kỹ thuật, 2011.
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7. Schedule (11 weeks)

Topics	Contents	Notes
1. Review	- Introduction. - Review.	Discussion Exercise
2. Pointer	- Pointer concepts. - Pointer usage. - Pointer vs. array.	Quiz: Chapter 11
3. Pointer (cont)	- Dynamic memory management. - Pointer to pointer. - Other types of pointers.	Quiz: Chapter 17
4. Binary file	- Dynamic string, <string.h>. - Binary file. - main() arguments.	Quiz: Chapter 22
5. Binary file (cont)	- Struct IO, <stdint.h>. - Bitmap format.	Discussion Exercise
6. Midterm Exam		
7. Recursion	- Introduction. - Classifications. - Techniques: regression formula, divide and conquer, backtracking.	Chapter 5 (DSA)
8. Recursion (cont)	- Recursion analysis. - Recursion problems: Hà Nội Tower, 8-Queens, Knight Tour.	TA: Discussion Exercise
9. Linked list	- Concepts. - Operations: init, find, add, remove.	Quiz: Chapter 3 (DSA)

	- Improvements: doubly linked list, skipped list.	
10. Stack and Queue	- Stack: concept, implementation. - Queue: concept, implementation.	TA: Discussion Exercise
11. Sorting and Dynamic Programming	- Sort algorithms: selection sort, merge sort. - Dynamic programming.	