

作業系統 **Operating Systems (Spring 2023)**
by
Prof. 施吉昇 Daniel C.-S. Shih/林忠緯 Chung-Wei Lin

Class website: <https://cool.ntu.edu.tw/courses/23234>

The class meets on every **Tuesday from 9:10AM to 12:00PM at Room 102@CSIE (Section 1/Odd) and Room 104@CSIE (Section 2/even)** building.

TAs:

林祥瑞, 曾奕青, 葉璟諱, 林佑鑫, 朱家慶, 林楷恩

Office Hour:

Prof. Chi-Sheng Shih, 9AM to 10:30PM on every Friday at Rm. 523 or by appointment.

Course Description:

This course is designed for junior CS-major students and serves as the introduction system-level course. In this course, we will learn how the operating systems are designed and implemented. The following are the goals of this course.

1. To be familiar with the architecture and design of operating systems.

The course means to teach how the modern operating systems are structured, and how the major sub-systems in modern operating systems are designed and implemented. The students are expected to design and implement application/domain specific operating systems at end of the course.

2. To become good system programmers.

It means that you will have the capability of implementing an operating systems for special purposes. The learning process that you will have in this course should teach you how a good operating system should be and how the design of operating system may affect the performance of user applications. Hence, it will lead to design and implement an operating system at small to mid-size.

At the end of the semester, you may want to go through this list again to see if the goals are met. We will appreciate if you could provide us your comments regarding the class at the end of the semester. (Well, you can send us your comments at any time. However, I guess that it is more reasonable to review the class at the end of the semester.)

Prerequisites:

The students should be familiar with data structures, system programming, and basic C/C++ programming.

Text Book:

There is one required text book: *Operating system concepts* by “Galvin, Peter B., Greg Gagne, and Abraham Silberschatz, John Wiley and Sons, ISBN 978-1-118-06333-0. It is distributed by Ten-Long (天瓏圖書) in Taiwan. Other reference books, internet website will be available on the class website.

Optional reference book:

- “Xv6, a simple Unix-like teaching operating system” by R. Cox, M.F. Kaashoek, & R. Morris, 2011, <https://pdos.csail.mit.edu/6.S081/2020/xv6.html>.
- “Advanced Programming in the Unix Environment” third edition by W. Richard Stevens and Stephen A. Rago, Addison-Wesley, 2013. It is distributed by 開發圖書有限公司.

- *Understanding Unix/Linux Programming: A Guide to Theory and Practice*, Molay, Prentice Hall, ISBN: 0130083968

Lecture slides and handouts will be available on the class web site. Please check out the slides and handouts before the class. The handouts will NOT be distributed in the class. Note that the lecture slides should NOT be the only materials for you to study. They only serve as the guideline for you to study other materials including textbook and online resources. It is very likely that you will fail the exam if you only study the lecture slides.

Covered Topics:

- Process
- Thread
- Memory Systems
- Input and Output
- Interrupt
- Scheduling
- Mass Storage
- File Systems
- Synchronization

Grading Criteria (Subject to Changes):

We will have one mid-term, one final, and four programming assignments. Each written exam counts 28 points, and the programming assignments in total count 44 points.

Programming Assignments/Machine Problems (MPs):

Unless otherwise specified, all the assignments are individual assignments. Each student must submit his/her own assignments. Please read the [policy](#) section first before you start to work on your programming assignments. The submission must be done via the assignment submission web site on NTU COOL, which will be announced later in the class. All the submissions will be checked to detect plagiarism.

Policy:

Late Assignment: the programming assignments should be handed in via the provided web-based assignment submission system. All assignments must be handed in before 11:59PM at their corresponding due days. Because of the large class size, it is very likely that the assignment submission web site will be extremely busy at the last minutes. You should not wait until the last minute to submit your assignments. It is your responsibility to make sure that your assignments are handed in before the deadline. So, do it as early as possible. The TA's will not accept the assignments via emails or any other means. Check out the submission web site to see how to make sure your assignments are submitted successfully.

Only the assignments submitted before the deadline will receive full credit. 5% of your grade will be deducted for single day delay.

Plagiarism: There is NO tolerance for plagiarism. (As an engineer, you should check out [IEEE's code of ethics](#).) You can discuss the assignments with your classmates and/or friends. However, you MUST write the codes by yourself. It is YOUR responsibility to protect your own codes. Do not leave your codes on the table or screen.

Schedule:

The class schedule shown below is tentative and subjected to changes. The schedule is also available on the class web site and any change will be announced in the class and the class web site in advance.

Week #	Date	Topic	Reference textbook: OSC 10e	References Textbook: xv6	MP Assignment
1	23/02/21	Introduction of carouse and Recall from System Programming/ Introduction to Operating Systems	Ch1 and Ch2	Ch0	Lab0: Setup xv6
2	23/02/28	No Class (228 Memorial Day)			
3	23/03/07	Process	Ch3	Ch1	Lab0 Due
4	23/03/14	Thread	Ch4	Ch2	MP1 Ann
5	23/03/21	Memory system	Ch9	Ch3	
6	23/03/28	Memory system (Online for Section 01)	Ch10	Ch3	MP1 Due/MP2 Ann
7	23/04/04	No Class (Spring Break)			
8	23/04/11	Memory system	Ch10	Ch3	MP2 Due
9	23/04/18	MidTerm			
10	23/04/25	Scheduling	Ch5	Ch7	MP3 Ann
11	23/05/02	Scheduling+Mass Storage	Ch5	Ch7	
12	23/05/09	File Systems	Ch11 and 13		MP3 Due/
13	23/05/16	File Systems	Ch14 and 15	Ch8	MP4 Ann
14	23/05/23	Synchronization	Ch6 and Ch7	Ch6	
15	23/05/30	Synchronization	Ch6 and Ch7	Ch6	MP4 Due
16	23/06/06	Final Exam			