ISTD 50.005: Computer System Engineering (Spring 2018)

I. Synopsis

This course is about the design and implementation of complex computing systems, from single computer systems to a large-scale network of them. At the end of the course, students will be able to:

- Understand and analyze the challenges of designing and implementing complex computing systems, particularly modern operating systems and internet systems.
- Understand and make use of basic tools and methods to overcome the challenges of creating computing systems that are easy to manage, flexible and easy to extend, have high performance, and are reliable and secure.
- Understand and analyze the basic performance of computing systems.

II. Pre-requisites

- Good standing as Term 5 student in computer or information systems and engineering.
- Ability to understand program snippets in **both** Java and C.
- Ability to write extended programs in Java and, optionally, C.

III. Workload and grading (tentative and subject to change)

- In-class activities, quizzes, or homeworks (12%).
- Programming assignments x 2 (10%).
- Labs x 7 (14%).
- Exam 1 (32%) and Exam 2 (32%).

Notes:

- Unless otherwise specified, all work is to be submitted via eDimension.
- In-class activities and written homeworks (*excluding* labs and programming assignments) won't be graded. However, you should show a real attempt in answering the questions, and you must submit your answers by the deadline to get credit. By default, in-class activities are due within class time. To cover any contingencies, students can drop two in-class activities or written homeworks in the semester.
- Regular quizzes will be conducted in class. By default, you should be prepared for a quiz every time the class meets for the lab session, and the materials tested will be the portion covered in the lectures since the previous quiz. Quizzes will be held during the lab session. To cover any contingencies, students can drop the lowest two quizzes in the semester.
- Programming assignments are to be completed in groups of two students. Unless otherwise specified, all other work is individual work.
- Unless otherwise specified, you can use either Java or C for your lab programs. You can implement programming assignment 1 in either Java or C; programming assignment 2 must be implemented in Java.
- To cover any contingencies, students will have an allowance of two late days (**total** for the semester) for submitting their labs, and another two late days (**total**) for submitting their programming assignments. Once an allowance is used up, any late submissions will not be graded or earn credit.
- **Important**. Policy of academic honesty will be strictly adhered to. In particular, everything (including texts and code) that you submit must be originally authored by you (or your group in the case of group assignments), except that you can use content from the official course textbooks (but not any solution manuals). If you copy, quote, or paraphrase any other sources (including but not limited to friends, classmates, work by previous students in the course, sample solutions given previously by instructors of the course, solution manuals of any textbooks, textbooks other than the official ones listed in Sec. IV below, and any internet or public resources), you must *explicitly* reference the sources. Borrowing liberally or unnecessarily from third-party sources will reduce your credit, but proper citation will exonerate you from academic dishonesty. We will use automated tools to check for plagiarism of writing or programs.

IV. Textbooks

Silberschatz, Galvin, Gagne. Operating Systems Concepts with Java, 8th Ed. Wiley. ISBN 978-0-470-50949-4. **(required)**
Kurose and Ross. Computer Networking – A Top-Down Approach, 7th Ed. Pearson. ISBN 978-0-273-76896-8. **(required)**
Kernighan and Ritchie. The C Programming Language, 2nd Ed. Prentice Hall. ISBN 978-0131103627. (optional)

V. Meeting times and venue

- Cohort 1 Lectures: Mon and Tue 11:30am-1:00pm at CC13 (2.507).
- Cohort 2 Lectures: Mon 8:30-10:00am at CC13 (2.507) and Wed 11:30am-1:00pm at CC13 (2.507).
- Cohort 3 Lectures: Mon 1:30-3:00pm at CC14 (2.506) and Wed 11:30am-1:00pm at CC14 (2.506).
- Combined Labs: Thurs 1:00-3:00pm (combined) at LT2 (2.203)

VI. Teaching staff

Staff Name and email address		Office Hours
Instructors:	Prof. David Yau (david_yau@sutd.edu.sg)	Mon 11:30am to 1:30pm
	Dr Jit Biswas (jit_biswas@sutd.edu.sg)	Mon 3pm to 5pm
TAs:	Benjamin Kang (benjamin_kang@mymail.sutd.edu.sg)	
	Jay Prakash (jay_prakash@mymail.sutd.edu.sg)	
	Gayathri Sugumar (gayathri_sugumar@mymail.sutd.edu.sg)	
	Yin Ji Sheng (jisheng_yin@mymail.sutd.edu.sg)	
	Ooi Kai Lue (kailue_ooi@mymail.sutd.edu.sg)	

VII. Syllabus (tentative and subject to change)

Week	Date	Topic	Lab / Project
1	22 Jan	OS introduction OS structures and shell	• Lab 1: OS shell • Quiz
2	29 Jan	OS structures and shell (cont'd) Process and thread management	• **Programming assignment 1 release and discussion** • Quiz
3	5 Feb	Process and thread management (cont'd) Process synchronisation	• Lab 2: Multi-threading • Quiz
4	12 Feb	Process synchronisation (cont'd) Deadlocks	• Lab 3: Banker's algorithm • Quiz
5	19 Feb	Deadlocks (cont'd) File system	• Lab 4: File operations • Quiz
6	26 Feb	File system (cont'd) Networking basics	*(no lab)*
7	5 Mar	*(term break)*	**Programming assignment 1 due**
8	12 Mar	Network performance *(second class of week cancelled due to midterm exam)*	**Midterm exam during lab 1:00-3:00pm**
9	19 Mar	Network security	• Lab 5: ping/traceroute • **Programming assignment 2 released** • Quiz
10	26 Mar	Network security (cont'd) Internet naming and addressing	• Lab 6: Java JCE • Quiz
11	2 Apr	Internet naming and addressing (cont'd) Client-server and the web	• Lab 7: DNS • Quiz
12	9 Apr	Client-server and the web (cont'd)	• Consultation for programming assignment 2 • Quiz
13	16 Apr	Guest lecture Programming assignment 2 demos	**Programming assignment 2 due**
14	23 Apr	**Final exam** **(April 27 Fri, 3pm – 5pm)**	*(no lab)*