

## UNC Charlotte, Department of Computer Science

### ITCS 3146 – 001

### Operating Systems and Networking

Spring, 2016

Time: MW 9:30 AM – 10:45 PM

Room: Woodward 135

**Instructor:** Bojan Cukic

**Office:** Woodward 430A

**Office Hours:** W 10:45 am – 12 noon or by appointment

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**TA:** Zachary Chapman

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**Office hours:** TBA

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**Prerequisite:** [ITCS 2215](#) or permission of department.

#### Textbook:

- Tanenbaum, A. S., Bos, H., *Modern Operating System*, Pearson, Fourth Edition, 2015.

We will cover Chapters 1-3. Older editions are OK too.

#### Additional references:

- Deitel and Deitel: “*C: How to Program*”, Prentice Hall, NJ, 2001.
- K. A. Robins, S. Robins: “*UNIX Systems Programming*,” Prentice Hall, 2003.
- Partial class notes will be made available on Moodle.

### 1. Class Objectives

Hardware and software are, broadly speaking, two primary subsystems in modern computers. The aim of this course is to provide an introduction to systems software organization, primarily the software-hardware interface provided by operating systems. In order to achieve this, the class offers an in-depth coverage of the programming language of choice for system level programming, C, an introductory coverage of principles behind operating systems, and the programming interface between C and Linux family of operating systems. The topics of interest include process and thread management, interprocess communication, file and memory management and an introduction to computer networks.

### 2. Expected Learning Outcomes

Upon successful completion of this course, students should have:

1. Ability to design and implement programs in programming language C (C++).
2. Ability to use operating system interfaces: interrupts and system calls.
3. Ability to program run-time environments: processes, threads, synchronization primitives.
4. Ability to implement networking (TCP, client / server) and inter-process communication primitives.

### 3. Topics Covered

| WEEK # |   |
|--------|---|
| 1, 2   | System Abstractions, C Review, Static Data Structures, Functions, Recursion                 |
| 3, 4   | Pointers, Pointer Arithmetic, Parameter Passing by Reference                                |
| 5      | Binary File I/O, Binary Arithmetic  |
| 6, 7   | Asynchronous Programming (interrupts, system calls), Introduction to operating systems (OS) |
| 8, 9   | Processes and Threads.  |
| 10     | Inter-process communication (IPC ), Process Synchronization, Semaphores.                    |
| 12, 13 | Introduction to networking, OSI, TCP/IP, Pipes, Sockets.                                    |
| 14, 15 | Virtual memory, File system   |

#### 4. Tests

There will be 3 tests, accounting for an equal part of the final grade, and the final exam. Their tentative dates are:

- Test 1: The week of February 15<sup>th</sup>
- Test 2: The week of March 21<sup>st</sup>
- Test 3: April 25<sup>th</sup>
- Final exam: *Wednesday, May 11<sup>th</sup>, 8 AM – 10:30 PM.*

The final exam will be comprehensive, that is, it will cover all the material taught throughout the semester.

#### 5. Programming Assignments

There will be 3 programming assignments. **You are advised to start working on assignments well before the deadline**, in order to avoid delayed submission. Each day of delay will cost you 5% of the earned grade. Linux programming environment will be required for program development, execution and submission. You need to create a free account on [koding.com](https://www.koding.com). All programming in ITCS3146 will be done in C or C++ (**Java not acceptable**) and submitted for grading through Moodle. Programs MUST execute at [koding.com](https://www.koding.com) virtual machine, otherwise your grade will be 0. Detailed assignment descriptions will be given in class and on Moodle.

Tentative assignment dates:

- Assignment #1: Jan 27<sup>th</sup> to Feb 10<sup>th</sup>
- Assignment #2: Feb 29<sup>th</sup> to Mar 16<sup>th</sup>
- Assignment #3: Apr 4<sup>th</sup> to Apr 18<sup>th</sup>

#### 6. Grading

Tests and the final exam will account for 60% of the final grade. The remaining 40% will be derived from programming assignments. **You must obtain a passing grade (60% or higher average) in both parts (tests and assignments) in order to pass the course. THERE WILL BE NO EXCEPTIPONS TO THIS RULE.** The final exam is optional; If you are satisfied with your grade from the three tests, you do not need to take it. The final exam is mandatory if you do not take one of the tests (regardless of the reason). Skipping two or more tests in a semester results in a failing grade.

#### 7. Attendance, workload

ITCS 3146 is a hands-on course, and the expected workload is relatively high. You MUST be prepared to dedicate AT LEAST 5 working hours a week to this class (excluding the time spent in the classroom). This is the average. You are expected to attend all class sessions. The first three absences will be tolerated. For each absence after the third, we will deduct 2.5% from your final grade.

#### 8. Academic Honesty

Students are required to read and abide by the [Code of Student Academic Integrity](#) available from Dean of Students Office. Students are encouraged to discuss class topics. **However, collaboration during the implementation of programming assignments (outside the assigned teams, when applicable) and tests is strictly forbidden.** As a condition of taking this course, all programming assignment submissions may be subject to submission for program similarity review for the detection of plagiarism. All submitted papers will be included as source documents in the reference database solely for the purpose of detecting plagiarism. No student papers will be submitted for comparison without a student's [written consent](#) and permission. If a student does not provide such written consent and permission, the instructor may require a detailed oral reflection of your code for every program you submit. **Assignments with non-accidental similarities will receive the grade zero (0%). Repeated offense will lead to an F in the class.**

#### 9. Social Justice Statement

UNC Charlotte is committed to access to education. If you have a disability and need academic accommodations, please provide a letter of accommodation from Disability Services early in the semester. For more information on accommodations, contact the Office of Disability Services at 704-687-0040 or visit their office at Fretwell 230.