



# International University of Central Asia

## Information Technology Program

Agreed

« \_\_\_\_\_ » 2019

Program Head

\_\_\_\_\_

Approved

« \_\_\_\_\_ » 2019

Vice president for academic affairs  
and strategic planning

Kalchakeeva A. M. \_\_\_\_\_

## Syllabus – Spring 2019

**Instructor: Toksaitov Dmitrii Alexandrovich**

**Course name: Operating Systems**

**Credits: 4**

**Course Time: Tue, Th: 9:30-10:50**

**Office Hours: Sat, Sun (remotely through Skype at [toksaitov@hotmail.com](mailto:toksaitov@hotmail.com))**

**E-mail: [toksaitov\\_d@iuca.kg](mailto:toksaitov_d@iuca.kg)**

### I. Course Description

This course introduces students to the fundamentals of operating systems design and implementation. Topics include an overview of the components of an operating system, synchronization, implementation of processes, scheduling algorithms, memory management and file systems. Students will learn basics of the Unix environment, the C programming language, and the x86 assembly. These technologies will help them to finish lab and project tasks to build common Unix utilities, to study the concept of systems calls, to peak into the inner workings of the Linux kernel, and to implement a simple Fuse file system. This course is designed for Information Technology majors.

## II. Course Plan

Week	Topic	Hours
1	Introduction, History, OS Concepts Overview	3
2	System Calls	3
3	Scheduling	3
4	Interprocess Communication	3
5	Segmentation	1
5–7	Virtual Memory Management	8
8	Page Replacement Algorithms	3
9	Swapping	3
10–11	File System Implementation	6
11	Protection Mechanisms	3
12	Principles of I/O	3
13	Deadlocks	3
14–16	RAM Disks, Disks, Terminals	8

## III. Resources

### Course Materials, Recordings and Screencasts

Students will find all the course materials on GitHub. We hope by working with GitHub students will become familiar with the Git version control system and the popular (among developers) GitHub service. Though version control is not the focus of the course, some course tasks may have to be submitted through it on the GitHub Classroom service.

Every class is screen casted online and recorded to YouTube for students' convenience. An ability to watch a class remotely MUST NOT be a reason to not attend the class. Active class participation is necessary to succeed on this course.

- <https://github.com/iuca/iuca-os>

### Literature

#### Course Book:

- Modern Operating Systems, 4th Edition by Andrew S. Tanenbaum (ISBN: 978-0133591620)

#### Supplemental Reading:

1. Understanding the Linux kernel, Third Edition by Daniel P. Bovet and Marco Cesati (ISBN: 978-0596005658)
2. Linux Kernel Development, 3rd Edition by Robert Love (ISBN: 978-0672329463)
3. Windows Internals, Part 1 (6th Edition) by Mark E. Russinovich and David A. Solomon (ISBN: 978-0735648739)
4. Windows Internals, Part 2 (6th Edition) by Mark E. Russinovich and David A. Solomon (ISBN: 978-0735665873)
5. Mac OS X and iOS internals: to the apple's core by Jonathan Levin (ISBN: 978-1118057650)

6. Mac OS X Internals: A Systems Approach by Amit Singh (ISBN: 978-0321278548)

#### IV. Grading

The course grade is formed from the following:

Practice tasks	40 points (40%)
Quizzes	15 points (15%)
Course project	40 points (40%)
Piazza participation	5 points (5%)
<b>Total:</b>	<b>100 points (100%)</b>

#### V. Scale

	Points	US Transcript (4.0 system)	Grade (Transcript)	Kyrgyz Diploma Grade
A	94-100	4	Отлично	Отлично
A-	90-93	3,67	Отлично	Отлично
B+	87-89	3,33	Хорошо	Отлично
B	83-86	3.0	Хорошо	Хорошо
B-	80-82	2,67	Хорошо	Хорошо
C+	77-79	2,33	Средне	Хорошо
C	74-76	2.0	Средне	Хорошо
C-	70-73	1,67	Средне	Удовлетворительно
D+	67-69	1,33	Плохо	Удовлетворительно
D	63-66	1	Плохо	Удовлетворительно
D-	60-62	0,67	Плохо	Удовлетворительно
F	0-59	0	Провал	Неудовлетворительно

#### VI. Exams

Theory midterm and final will include quizzes with a list of multiple-choice and open questions. The quizzes are conducted in an electronic form.

For practice midterm and final students must prepare the list of labs and project tasks that they feel confident to defend. An inability to defend a single solution selected at random from the list of selected tasks by the student will result in a grade of F. Students will have 20 minutes to defend their work. The official documentation may be used during the exam. Any attempts to cheat will result in a grade of F. The instructor may ask a number of questions about the student's solution to ensure that he understands the work. The grade may be lowered at the discretion of the instructor if the student can't answer the question properly. The number of prepared tasks and a proper defense will form the final grade for the midterm examination.

## **VII. Policies**

- Attendance is mandatory. More than three misses without a reason will result in 5 points being deducted from the student. If a student has health/family/personal emergency, he must notify the instructor if possible (through e-mail), to increase the chances for the miss to be not counted.
- Active work during the class may be awarded with up to 10 points at the instructor's discretion.
- Poor student performance during a class can lead to up to 3 points deducted from his final grade.
- Late submissions will receive a penalty of 10 points for every day after the deadline.

We believe that a question from one student is probably a question that other students are also interested in. That is why we encourage students to use Piazza to ask questions in public that other students can see and answer and NOT ask them through E-mail in private UNLESS the question itself is about private matters to discuss with the instructor.

## **VIII. Academic Honesty**

Plagiarism can be defined as “an act or an example of copying or stealing someone else's words or ideas and appropriating them as one's own”. The concept of plagiarism applies to all tasks and their components, including program code, abstracts, reports, graphs, statistical tables, etc.

In addition to being unethical, this indicates that the student has not studied the given material. Tasks written from somewhere for 10% or less will be assessed accordingly or will receive a “0” at the discretion of the teacher. If plagiarism is more than 10%, the case will be transferred to the IUCA Disciplinary Committee.

For reports that contain “cut-and-paste”, the grade will be reduced, or the work will be canceled. Students are not recommended to memorize before exams, as this is a difficult and inefficient way to learn; and since practice exams consist of open questions designed to test a student's analytical skills, memorization invariably leads to the fact that the answers are inappropriate and of poor quality. Learning exams will decline at the discretion of the teacher.

The following are examples of some common acts of plagiarism:

- Representing the work of others as their own
- Buying work from a website or from another source and presenting it as your own work
- Copying sentences, phrases, paragraphs or ideas from other people's works, published or unpublished, without referring to the author
- Replacing selected words from a passage and using them as your own
- Copying from any type of multimedia (graphics, audio, video, Internet streams), computer programs, musical compositions, graphs or diagrams from other people's works without representation of authorship
- Using other people's ideas or phrases without specifying the author