International Information Technology University JSC

Faculty of Information Technology

Information Systems Department

Approved
Vice-Rector for Academic and
Educational Affairs of IITU JSC, PhD
_____Umarov T.F.
«___» _____ 2019

SYLLABUS
(ACADEMIC PROGRAM)

Course (code, title): «CSA3211 Computer Systems Architecture»

Major (code, title): 5B070300 «Information System»

Educational program (code, title): 6B06105 «Information System»

Year: 3; **Semester:** 5; **Number of credits**: 5 ECTS

Lectures: 15 hours

Laboratory classes: 30 hours

T/SIS: 105 hours

Total: 150 hours

Final assessment form: Examination

Almaty 2019

Academic program of the course (code, title) «CSA3211 Computer Systems Architecture» has been developed on the basis of Standard Academic Program.

Academic program has been reviewed at the meeting of Information Systems department.

Minutes №. 1 dated 27.09.2019

Head of the Department _____ V.V.Serbin

Author _____ Rakhmetulayeva S.B.

The academic program has been approved at the meeting of IITU SMC

Minutes №. 1 dated 10.09.2019

Head of IITU AMC, Vice-Rector
for Academic and Educational Affairs of IITU JSC, PhD _____
Umarov T.F.

Head of the Department
for Academic Affairs _____ Mustafina A.K.

Syllabus
for the course
«CSA3211 Computer Systems Architecture»
Academic Year 2019 -2020

1. General information	
Faculty	Information Technology
Major code and title	Information Systems (5B070300)
Year, semester	3 year, 5 semester
Subject category	Basic
Number of credits	2
Language of Delivery:	English
Prerequisites:	Operating systems
Postrequisites:	Robotics
Lecturer	PhD, Assistant professor, Rakhmetulayeva S.B., Tel: +77026980916 Email: ssrakhmetulayeva@gmail.com
Instructors	Lecturer Myrzakanurov Arman Email: myrzakanurov.a@gmail.com

2. Goals, objectives and learning outcomes of the course

Course goals: The purpose of the course is to familiarize the students with the basic knowledge of the construction and work of the computer system and with the low-level programming skills and the factors influencing the design of hardware and software elements of computer systems.

Course objectives:

- to apply important the structure of current processors and computer systems and will be ready to work on advanced development and research in the area of computer architecture.
- to progress the students' skills in using modern architectural design tools, such as architecture simulators, area/complexity estimators and power/energy estimators, to design processors at the architectural level.
- to provide a foundation for students interested in performance programming, compilers, and operating systems; and it can provide system-level context for students interested in emerging technologies and digital circuits.

Learning Outcomes:

By the end of the course the students will be able to**:**

- understand inner workings and performance capabilities of processors
- select an appropriate computer system for given application domains
- differentiate the memory types and their operating principles
- program microcontrollers using low-level programming languages
- be able to read and understand an assembly code

3. Course description

The course "Architecture of computer systems" presents basic computer hardware element concepts, equipment principles, and computer performance evaluation techniques that are used in computer system design processes. Course also includes the fundamentals of assembly language and programming of microcontroller and its components.

4. Course policy

(Delays and omissions of lessons, conditions of passing to missed lessons working off, intermediate attestation, late submission of independent works, attitude of student in auditory and etc.)

Rating control of knowledge is used for providing systematic and regular control on study work of student during semester in IITU. Accomplishment of 6 laboratory works, course project and test exam are the parts of current control of knowledge examination.

Deadlines of current control are defined by calendar graphic of study process on discipline.

5. Literature

Basic literature:

1. Hennessy and Patterson Textbook – The primary required textbook for the course is "Computer Architecture: A Quantitative Approach, 5th ed.," by J. L. Hennessy and D. A. Patterson (Morgan Kaufmann, 2013).
2. Stallings W. (2013). Computer Organization and Architecture: Designing for Performance. Prentice Hall, 9th edition.
3. Tanenbum A. (2016). Structure Computer Organization. Pearson Prentice Hall, 5th edition

Supplementary literature:

5. Null J., Lobur J., The essentials of computer organization and architecture, Jones & Bartlett Learning, 2016.
6. Stallings W., Computer Organization and Architecture, Prentice Hall, 2010.7. Chalk B.S., Computer Organization and Architecture, Palgrave Macmillan, 2013.

6. Course calendar

6.1 Lecture, practical/seminar/laboratory session plans

№	Abbreviation	Meaning
1	TSIS	Teacher-supervised independent work (СРСП)
2	SIS	Students' independent work (СРС)
3	IP	Individual project
4	PA	Practical assignment
5	LW MCQ	Laboratory Work Multiple choice quiz

Week/ dates	Course Topic	Reference Materials	Lectures (1 h/w)	Laboratory Work (2 h/w)	TSIS (2 h/w)	SIS (4 h/w)
1	Main notions. Subject area of ACS. Structure of ACS. History of Computer Architecture.	[1], [2]	1	2		2
2	Arithmetic fundamentals of number systems	[1],[2], [4], [6]	1	2	5	3
3	Computer performance measurement. Amdahl's Law.	[1],[2], [4], [6]	1	2		3
4	Memory Hierarchy	[2], [3]	1	2	5	3
5	Cache Optimizations. Virtual Memory	[2], [3]	1	2		3
6	Pipelining. Pipeline hazards	[2]	1	2		3
7	Basics of Assembly Language	[1], [2]	1	2		2

8	*Midterm control*	[1], [2], [3], [4], [5], [6]	1	2	5	3
9	Introduction to Microcontrollers and Embedded systems	[1], [4]	1	2		3
10	Programming of Microcontrollers	[4], [5], [1], [6]	1	2		4
11-12	LCD interfacing with ATMEGA2561	[5]	2	4		4
13-14	Concurrency in CSA	[4]	2	4	5	4
15	*Endterm*	[1], [2], [3], [4], [5], [6]	1	2		2
	Total hours	**90**	**15**	**30**	**20**	**40**

6.2 List of assignments for Student Independent Study

№	Assignments (topics) for Independent study	Hours	Recommended literature and other sources (links)	Form of submission
1	2	3	4	5
1	Numbering Systems and Numeric Representations	4	[2], [1]	Write code in a programming language using C or C++ language
2	Generation Of Computer	4	[3], [4]	Presentation in PowerPoint.
3	Central Progressing Unit (CPU)	4	[3], [4], [6]	Participation in Discussions
4	Memory hierarchy	5	[2], [5]	Write code in any programming
5	Calculating the cost of the development of the Architecture of computer systems	4	[1], [3], [4]	Calculation of the printed report
6	Development of presentation «Peripheral Devices»	4	[3], [5], [6]	Presentation in PowerPoint.

7. Student performance evaluation system for the course

Period	Assignments	Number of points	Total
1st attestation	laboratory works: 1 LW, 2 LW, 3 LW, 4 LW, 5 LW,	**50** 10 10 10 10 10	100

	Practice: 1 Exercise, 2 Exercise, 3 Exercise, **Mid term** **Student Independent Study**	 5 5 5 **30** **5**	
2nd attestation	laboratory works: 1 LW, 2 LW, 3 LW, 4 LW, 5 LW, **Practice:** 1 Exercise, 2 Exercise, 3 Exercise, **Mid term** **Student Independent Study**	**50** 10 10 10 10 10 5 5 5 **30** **5**	100
Final exam	**Exam**		100
Total	**0,3*1stAtt+0,3*2ndAtt+0,4*Final**		**100**

*If the number of absences exceeds 20%, student will be automatically scheduled for a Retake (summer semester)

Achievement level as per course curriculum shall be assessed according to the evaluation chart adopted by the academic credit system:

Letter Grade	Numerical equivalent	Percentage	Grade according to the traditional system
A	4,0	95-100	Excellent
A-	3,67	90-94	
B+	3,33	85-89	Good
B	3,0	80-84	Good
B-	2,67	75-79	
C+	2,33	70-74	Satisfactory
C	2,0	65-69	Satisfactory
C-	1,67	60-64	
D+	1,33	55-59	
D	1,0	50-54	Satisfactory
	0	0-49	Fail

8. METHODOLOGICAL GUIDELINES

Assessment is administered continuously throughout the course. The students are rated against their performance in continuous rating administered throughout the semester (credited 60%) and summative rating done during the examination session (credited 40%), total 100%. Continuous rating is students' on-going performance in class and independent work. Class work is assessed for attendance, laboratory works' defense and in- class assessments.

TSIS (Teacher Supervised Student Independent Study) -comprises presentation to be done by students independently and checked by instructor.

Mid-term and End-term is a review of the topics covered and assessment of each student's knowledge.

Final assessment is a combination of both written exam and project to evaluate the students' academic performance and professional skills.