ASTANA IT UNIVERSITY

«Approved»
by the Dean
Syzdykova Z.A.
«08» 06 2024

Syllabus
Academic Year 2024-2025

1. General information	
Course title	Computer Organization and Architecture
Degree cycle (level)/ major	6B06101 "Computer Science" 6B06102 "Software Engineering" 6B06103 " Big Data Analysis" 6B06105 "Media Technologies" 6B04101 "IT Management" 6B04102 "IT Entrepreneurship"
Year, term	2, 4 and 2, 5
Number of credits	5
Language of delivery:	English
Prerequisites	Students should have the following skills and knowledge: • PC and Internet navigation skills • ICT or basic computer knowledge
Postrequisites	-
Lecturer(s)/ Tutor(s)	**Abdiramanov Orisbay** MSc in Automation and control, teacher, o.abdiramanov@astanait.edu, Astana IT University, Expo, C1.3.352. **Algys Saltanat,** MSc in Information and Communication engineering, teacher, a.saltanat@astanait.edu.kz, Astana IT University, Expo, C1.3.352. **Alibek Orynbek,** MSc in Economic science, senior-lecturer, alibek.orynbek@astanait.edu.kz, Astana IT University, Expo, C1.3.352. **Sandibek Umirov,** MSc in Computer system and Software, senior-lecturer, s.umirov@astanait.edu.kz, Astana IT University, Expo, C1.3.352. **Azimbayev Baurzhan,** MS of Economical Sciences in Project management, teacher, b.azimbayev@astanait.edu.kz Astana IT University, Expo, C1.3.352 **Dana Yespenbetova** , MSc in Computer Science, senior lecturer , dana.yespenbetova@astanait.edu.kz , Astana IT University, Expo, C1.3.352
2. Goals, objectives and learning outcomes of the course	
1. Course description	"Computer Organization and Architecture" is a 10-week course. This course covers the fundamentals of computer hardware and software as well as advanced concepts. Students who complete this course will be able to describe the internal components of a computer, assemble a computer system, install an operating system, and troubleshoot using system tools and diagnostic software. Students will also be able to connect to the Internet and share resources in a network environment. The topics included in this course include laptops and portable devices, wireless connectivity, security, safety and environmental issues, and communication skills. In addition to learning the fundamentals of hardware, software, and operating systems, students develop problem solving, critical thinking, collaboration, communication, negotiation, and entrepreneurial skills, which can help them succeed today's global workplace. Hands-on lab activities will continue to be an essential element of the course. In support of this, virtual learning tools have been integrated into this course. The Virtual Laptop, Virtual Desktop are stand-alone tools designed to supplement classroom learning and provide an interactive "hands-on" experience. Cisco Packet Tracer activities are designed for use with Packet Tracer. The use of Packet Tracer will support alignment with the new CompTIA A+ certification objectives.
2. Course goal(s)	Course goal is to introduce the students to computer hardware and software, as well as operating systems, mobile devices, networking concepts, IT security and

	troubleshooting. These course materials will assist you in developing the skills necessary to work as a technician in the field of IT.
3. Course objectives:	The primary objective of this course is to prepare students for entry-level positions in the IT field within several different working environments. Job titles include enterprise technician, IT administrator, field service technician, and PC technician. A remote-based work environment where client training, operating systems, and connectivity issues are emphasized. Job titles include remote support technician, help desk technician, call center technician, IT specialist. In addition, students will gain confidence with the components of desktop and laptop computers by learning the proper procedures for hardware and software installations, upgrades, and troubleshooting.
4. Skills & competences	The course designed for people who are new to the study of information technology, and does not require any prior skills.
5. Course learning outcomes:	Upon completion of the course, students will be able to perform the following tasks: • Explain, install, and navigate an operating system; upgrade components based on customer needs and perform preventive maintenance and advanced troubleshooting. • Describe, remove, and replace select components of a laptop; upgrade components based on customer needs and perform preventive maintenance and advanced troubleshooting. • Describe, remove, and replace select components of a printer/scanner; perform preventive maintenance and troubleshooting. • Describe and install a network; upgrade components based on customer needs and perform preventive maintenance and advanced troubleshooting. • Apply good communication skills and professional behavior while working with customers. • Perform advanced installation of a desktop computer tower; select components based on customer needs and perform preventive maintenance and advanced troubleshooting. Upgrade security components based on customer needs and perform preventive maintenance and advanced troubleshooting.
6. Methods of assessment	Each chapter includes a hands-on labs and two exams. After each chapter, all labs and exam tests will be assessed. - Lab assignment (completion) - Theoretical Exam (test) - Practice Exam (test)
7. Reading list	1. CompTIA A+ Certification All-in-One Exam Guide, Eleventh Edition (Exams 220-1101 & 220-1102) 11th Edition, 2022 2. Essentials of Computer Architecture, Second Edition, Douglas Comer, 2020
8. Resources	Online journals, article, papers, books and internet resources.
9. Course policy	**Course and University policies include:** **Attendance:** Attendance is not allocated any grading points in the marking scheme, but is compulsory to pass the course. Normally students are required to achieve course attendance of minimum 70% in practice lessons to get admitted to the examination rubric. In case a student misses 30% or more practice class sessions without a valid excuse the instructor has the right to mark him as "not graded". In such case a student is not admitted to the exam and automatically fails the course. It should be NOTED that in cases when a student is excused for 30% of the scheduled class sessions or more, he or she has to study material provided under the course on

	their own. Course instructor might provide additional opportunities to submit missed graded pieces of work during office hours or conduct alternative assessment exercises using method of his or her choosing. **Preparation for Class**: Class participation is a very important part of the learning process in this course. Although not explicitly grade, students will be evaluated on the QUALITY of their contributions and insights. Quality comments possess one or more of the following properties: - Offers a different and unique, but relevant, perspective; - Contributes to moving the discussion and analysis forward; - Builds on other comments. **Class work**: The duration of each lecture and practical lesson is 50 minutes for offline class, and 40 minutes for online class. Students are expected to complete all readings and assignments ahead of time, attend class regularly and participate in class discussions. In case of systemic student's misconduct, the student can be dispensed from the classes. **Being late on class:** When students come to class late, it can disrupt the flow of a practical lesson or discussion, distract other students, impede learning, and generally erode class morale. Moreover, if left unchecked, lateness can become chronic and spread throughout the class. Therefore, the being late to the class is not welcome and can have restriction activities by the course instructor. **Attestation I and II:** Students, who score less than 25% for Attestation period I or Attestation period II (RK1/RK2) automatically fail the course. **Office hours:** office hours depend on each teacher and time schedule/location must be discussed personally. **Home work / Assignments**: The assignments are designed to acquaint students with the theoretical knowledge and practical skills required for the course. The textbook readings will be supplemented with materials collected from recent professional articles and journals. In case of using someone's work (papers, articles, any publications), all works must be properly cited. Failure to cite work will be resulted as a cheating from the students and may be a subject of additional disciplinary measures. **Late submissions:** Most assignments will be discussed in class on the due date. It is expected that all work will be submitted on time. All gradings are based using a percentage grading scale. *In the case of some extraordinary event, students should notify the course instructor and request an extension of the deadline for submission. If approved, a new date will be given to the student depending upon the circumstances by the instructor.* **Final exam** The mandatory prerequisite to go on final exam is to complete "IT Essentials" course by CISCO NetAcad.com and "Generative AI" course by Google.com and upon successful completion get certificate. Otherwise student is not allowed to take final exam. **Test.** The final test exam for the course "Computer Organization and Architecture" includes two parts. The first part is a multiple-choice test for one hour which covers the most theoretical part of the course. The second part is practical questions. At the completion of the exam, all works must be submitted in the Learning Management System (moodle.astanait.edu.kz). No late submissions are allowed in the exam. **Laptops and mobile devices** can only be used for classroom purposes when directed by the teacher. Misuse of laptops or handheld devices will be considered a breach of discipline and appropriate action will be initiated by the teacher. Laptops are mandatory for those practical session which requires connectivity to laboratory equipment. Laptop must be on Windows based operating system with RJ45 port or adapter.

	Online lessons can be used in case if there won't be a chance to make offline traditional lessons. It must not discourage the interest and enthusiasm of students. The main software to run the online lessons is Microsoft Teams for video calls and live webinars, and Moodle (moodle.astanait.edu.kz) as a Learning Management System. Also, some alternatives such as Skype or Telegram messenger may be involved as an additional workaround. **Cheating and plagiarism** are defined in the Academic conduct policies of the university and include: 1. Submitting work that is not your own papers, assignments, or exams; 2. Copying ideas, words, or graphics from a published or unpublished source without appropriate citation; 3. Submitting or using falsified data; 4. Submitting the same work for credit in two courses without prior consent of both instructors. Any student who is found cheating or plagiarizing on any work for this course will receive 0 (zero) for that work and further actions will also be taken regarding academic conduct policies of the university. **Academic Conduct Policies of the university:** The full texts of all the academic conduct code will be posted to the students using Learning Management System (moodle.astanait.edu.kz). **Contacting the Instructor (Teacher)**: The easiest and most reliable way to get in touch with the teacher is by email. Students must feel free to send email if you have a question related to the course. The teachers will respond as soon as they can but not always instantaneously. Besides that, students are also welcomed to arrange a one-to-one meeting with the teacher by their office during office hours to discuss the class using both offline and online ways.

** Final exam can be given by instructor in the any other forms such as Written Exam, Final Quiz, Oral Tasks and Exams, etc.*

3. Course Content

#	Abbreviation	Meaning
1	TSIS	Teacher-supervised independent work
2	SIS	Students' independent work
3	IP	Individual project
4	PA	Practical assignment
5	LW	Laboratory work
6	MCQ	Multiple choice quiz

3.1 Lecture, practical/seminar/laboratory session plans

Week No	Course Topic	Lectures (H/W)	Practice sessions (H/W)	Lab. sessions (H/W)	TSIS (H/W)	SIS (H/W)
1	**Chapter 1 Personal Computers Hardware** **1. Lab - Disassemble a Computer**	2	3	0	1	9
2	**Chapter 2 PC Assembly** **2. Lab - Install the Power Supply, Motherboard, Drives, Adapter Card, Internal Cables, Front Panel Cables** **Chapter 3 Advanced Computer Hardware** **3. Lab - Investigate BIOS or UEFI, Install Windows**	2	3	0	1	9

3	**Chapter 4 Preventive Maintenance and Troubleshooting** **4.1 Lab – Use a Multimeter and a Power Supply Tester, Troubleshoot Hardware Problems**	2	3	0	1	9
4	**Chapter 5 Networking Concepts** **5. Lab - Build and Test a Network Cable**	2	3	0	1	9
5	**Chapter 6 Applied Networking** **6. Lab - Configure a NIC to Use DHCP in Windows**	2	3	0	1	9
6	**Chapter 7 Laptops and Other Mobile Devices** **7. Lab – Mobile Device Information**	2	3	0	1	9
7	**Chapter 9 Virtualization and Cloud Computing** **9. Lab - Install Linux in a Virtual Machine and Explore the GUI**	2	3	0	1	9
8	**Chapter 11 Windows Configuration** **11. Lab - Work with Task Manager, File Explorer, Control Panel, User Accounts, Browser Settings, Device Manager**	2	3	0	1	9
9	**Chapter 12 Mobile, Linux, and macOS Operating Systems** **12. Lab - Working with iOS** **Chapter 13 Security** **13. Lab - Configure Windows Local Security Policy, Users and Groups in Windows**	2	3	0	1	9
10	**Chapter 14 The IT Professional** **14. Lab - Remote Technician - Fix a Hardware Problem**	2	3	0	2	9
	Total hours: 150	**20**	**30**	**0**	**10**	**90**

3.2 List of assignments for Student Independent Study

№	Topics for independent study	Hours	Recommended literature and other sources (links)	Form of submission
1	1. Power Supply Wattage 2. Ohm's Law 3. CPU Architectures 4. Memory Modules 5. Storage Device Interfaces and RAID 6. Ports and Cables 7. Sharing Resources in Windows 8. Network Drive Mapping 9. Broadband Technologies 10. Authentication Services	9	Books, internet resources	Exercises
2	1. Electrical Safety 2. Fire Safety 3. ESD and EMI 4. Cable Tools 5. Diagnostic Tools Diagnostic Software	9	Books, internet resources	Exercises
3	1. Reference Tools 2. Miscellaneous Tools 3. Hand Tools	9	Books, internet resources	Exercises

	4. Computer Disassembly 5. Install the Drives 6. Cellular WAN 7. Keyboard, Touchpad, and Screen 8. Solid State Drives 9. Wearable Devices Investigating Support Websites			
4	1. Types of Adapter Cards 2. Internal Data Cables 3. Front Panel Cables 4. External Cables 5. POST, BIOS, UEFI 6. OS X Operating Systems 7. Android vs. iOS 8. Open Source versus Closed Source Managing Apps, Widgets, and Folders	9	Books, internet resources	Exercises
5	1. Benefits of Preventive Maintenance 2. Preventive Maintenance Tasks 3. Environmental Concerns 4. PC Common Problems and Solutions 5. iOS Touch Interface 6. Mobile Device Features 7. Passcode Locks Remote Backup	9	Books, internet resources	Exercises
6	1. Types of Operating Systems 2. Network Operating Systems 3. Data Migration 4. File Systems Disk Management	9	Books, internet resources	Exercises
7	1. Installation Options 2. Disk Cloning 3. System Recovery Options 4. Disk Management Utility 5. Disk Partitioning 6. Drive Mirroring 7. Printer Connection Types 8. Thermal Printers 9. Types of Print Drivers Software Optimization	9	Books, internet resources	Exercises
8	1. Task Manager 2. Windows Firewall 3. System Utility 4. Services 5. Common Windows CLI Commands 6. Virtual Machine 7. Wireless Printer Connections 8. Software Print Servers 9. Vendor Guidelines Vendor Guidelines	9	Books, internet resources	Exercises

9	1. Backup Tool 2. Network Media 3. Bandwidth and Latency 4. Client-Server Networks 5. OSI Model 6. TCP/IP Model 7. Modems 8. Wireless Access Points 9. Cables and Connectors 10. Types of Security Threats 11. TCP/IP Attacks 12. Zero-Day Attacks Security Policy	9	Books, internet resources	Exercises
10	1. Twisted-Pair Cables 2. Types of Fiber Media 3. IPv4 vs. IPv6 4. Classful and Classless IPv4 Addressing 5. Role of the Transport Layer 6. Port Numbers 7. Data Wiping 8. Signature File Updates 9. Communication Encryption Types 10. Using Proper Netiquette Ethical and Legal Issues in the IT Industry	9	Books, internet resources	Exercises

4. Student performance evaluation system for the course

Period	Assignments	Number of points	Total
1st attestation	**Assignments:** Assignment 1. Crimping cables Assignment 2. Disassemble PC, HDD. Assignment 3. Disassemble Laser Printer Assignment 4. Accessing Network Switch **Management** **Mid term**	**60** 15 15 15 15 **40**	100
2nd attestation	**Assignments:** Assignment 5. Organizing LAN, IP camera, Video surveillance Assignment 6. DHCP, FTP server and client, IIS, Web Server Assignment 7. LiveUSB, Virtualization Assignment 8. Virtual machine with VMware ESXi **End term**	**60** 15 15 15 15 **40**	100
Final exam	**Multiple-choice test**	**Test:** Final exam consists of the 40 questions. Theoretical questions = 20 Practical	100

		Questions = 20	
Total	**0,3 * 1st Att + 0,3 * 2nd Att + 0,4*Final**		**100**

*** *Assignment topics and assignment quantity may vary depending on the teacher's decision.*

** *The number of assignments can be different. It depends from the course program and designed by course syllabus. But the total points of the assignment are 60 in each control period.*

* *Final exam can be given by instructor in the any other forms such as Written Exam, Final Quiz, Oral Tasks and Exams, etc.*

–

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	
B-	2,67	75-79	
C+	2,33	70-74	
C	2,0	65-69	Satisfactory
C-	1,67	60-64	
D+	1,33	55-59	
D	1,0	50-54	
FX	0	25-49	Fail
F	0	0-24	

Based on the specific grade for each assignment, and the final grade, following criteria must be satisfied:

Grade	Criteria to be satisfied
90-100	- Work would be worthy of further dissemination under appropriate conditions - Mastery of advanced methods and techniques at a level beyond that explicitly taught - Ability to synthesize and employ in an original way idea from across the subject - Outstanding command of critical analysis and judgment
80-89	- Excellent range and depth of attainment of intended outcomes - Mastery of a wide range of methods and techniques - Evidence of study and originality of what has been taught - Able to display a command of critical analysis and judgement
70-79	- Attained all the intended learning outcomes for a unit - Able to use well a range of methods and techniques to come to conclusions - Able to employ critical analysis and judgement

60-69	- Some limitations in attainment of learning objectives, but has managed to grasp most of them - Able to use most of the methods and techniques taught - Evidence of study and comprehension of what has been taught but grasp insecure - Some grasp of the issues and concepts underlying the techniques and material taught, but weak and incomplete
50-59	- Attainment of only a minority of the learning outcomes - Able to demonstrate a clear but limited use of some of the basic methods and techniques taught - Weak and incomplete grasp of what has been taught - Deficient understanding of the issues and concepts underlying the techniques and material taught
25-49	- Attainment of nearly all the intended learning outcomes deficient - Lack of ability to use at all or the right methods and techniques taught - Inadequately and incoherently presented - Wholly deficient grasp of what has been taught - Lack of understanding of the issues and concepts underlying the techniques and material taught
0-24	No significant assessable material, absent or assessment missing a must pass component

5. Methodological Guidelines

Assessment is administered continuously throughout the course. The students are rated against their performance in continuous rating administered throughout the semester (60%) and summative rating done during the examination session (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. The form of the midterm and end term exams is complex.
- **Final assessment**: Course "Computer Organization and Architecture 1 includes two parts of the multiple-choice test. The first 50 questions are theoretical questions. The rest is practical questions. At the completion of the exam, all works must be submitted in the Learning Management System (moodle.astanait.edu.kz). No late submissions are allowed in the exam

6. Lecturer (lecturers) approvals Full name Job title Date Sign

Full name	Job title	Date	Sign
Dana Yespenbetova	Senior-lecturer	26/08/2024	
Abdiramanov Orisbay	teacher	26/08/2024	
Alibek Orynbek	Senior-lecturer	26/08/2024	
Algys Saltanat	teacher	26/08/2024	
Sandibek Umirov	Senior-lecturer	26/08/2024	
Azimbayev Baurzhan	teacher	26/08/2024	

Director of Department of Computer Engineering _____ **Praveen Kumar**