**The Ministry of Education of the Azerbaijan Republic**

**The State Oil Company of the Azerbaijan Republic**

**Baku Higher Oil School**

Information Technologies Department

**Cloud Technology and Blockchain**

**Course Syllabus**

Spring, 2024

Instructors: Nihad Əlili, İsmayıl Eyyub

Course Code: IS 362 Course Credit: 5

Office: 303, Campus, Aypara Office Hours: Mon-Fri 09:00-16:00

Prerequisites: -

Language of Instruction: English

Schedule: Mon 09:00-10:50; Thu 10:00-10:50, 13:00-13:50

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**Description about course**

The course aims to provide a basic awareness of contemporary digital technologies, specifically Cloud Technology and Blockchain, as well as a foundational knowledge of their security implications. The course explores the transformative capabilities of these technologies, as they have the potential to revolutionize multiple sectors in the near future. The course will focus on examining the fundamental principles of Cloud Technology and Blockchain, as well as their practical applications. It will also investigate the potential interactions and ramifications of these technologies with IT, legal, and regulatory systems, and address the security challenges they provide. Moreover, the course will contextualize Cloud Technology and Blockchain within the framework of technical advancement and progress, imparting students with a holistic comprehension of their influence in creating the future of the digital realm.

**Learning outcomes section**

At the end of the course, the student will be able to:

* Understand the fundamental components of Cloud Technology and Blockchain technology, including the basics of distributed systems, cryptographic principles, and how data is stored and managed.
* Gain a basic understanding of how to use cloud services and interact with Blockchain platforms.
* Understand different types of cloud computing models such as Public, Private, and Hybrid clouds, and different types of blockchain like Public, Private, and Consortium blockchain.
* Comprehend the similarities and differences between Cloud Technology and Blockchain with conventional IT systems.
* Gain a basic understanding of what smart contracts are and how they function within a blockchain.
* Understand the importance and basics of security measures in Cloud Computing and Blockchain, including data protection and encryption.

**Assessment methods**

Discussion and Teamwork about question, Quizzes, Final Exam

**Grading**

**Type Weight Date Duration**

Final Exam 50% TBA (to be announced) 120

Quiz 30% 6th week of the semester 100

Presentation 10% One per semester deadline

Laboratory 10% Three per semester deadline

**Resit Grading (**in case of a failed Final exam**):**

Weight: 50%

Total score after Resit exam is Resit score (50%) + Quiz score (30%) + Presentation (10%) + Laboratory (10%)

**Note:**

* A total of 1 Quiz will be held.
* Total number of labs is 2. Each lab is graded separately. At the end of the term the average mark of the labs is calculated.
* Total number of presentations is 3. Each presentation is graded separately. At the end of the term the average mark of the presentations is calculated.

**Area grading scale**

A 91-100

B 81-90

C 71-80

D 61-70

F ≤ 60

**Rules**

**Exams**

In order to be excused from the exam, the student must contact the dean and the instructor before the exam. Excuse will not be granted for social activities such as trips, cruises and sporting events (unless you are participating). The exams will all be cumulative. Most of the questions on each exam will be taken from the chapters covered since the last exam.

But some will come from the earlier chapters. In general, the coverage will reflect the amount of the time spend in class on the different chapters.

**Withdrawal (pass / fail)**

This course strictly follows grading policy of the Information Technologies Department. Thus, a student is normally expected to achieve a total mark (pre-exam score + exam score) of at least 61 to pass. In this case of failure, the student will be referred or required to repeat the course the following term or year.

**Late policy**

Late assignment submissions won’t be accepted for grading. The grade for this assignment will be **zero**.

**Teaching Resources**

**Presentations**: Cloud Technologies and Blockchain

[1] Thomas Erl, Ricardo Puttini, Zaigham Mahmood - "Cloud Computing: Concepts, Technology & Architecture" Prentice Hall, 2013, ISBN: 978-0133387520.

[2] Ray J. Rafaels - "Cloud Computing: From Beginning to End" CreateSpace Independent Publishing Platform, 2015, ISBN: 978-1511406796.

[3] Michael J. Kavis - "Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS)" Wiley, 2014, ISBN: 978-1118617618.

[4] Daniel Drescher - "Blockchain Basics: A Non-Technical Introduction in 25 Steps" Apress, 2017, ISBN: 978-1484226032.

[5] Imran Bashir - "Mastering Blockchain: Unlocking the Power of Cryptocurrencies, Smart Contracts, and Decentralized Applications" Packt Publishing, 2017, ISBN: 978-1787125445.

[6] Tiana Laurence - "Blockchain for Dummies" For Dummies, 2017, ISBN: 978-1119365594.

[7] Martin G. Kienzle, Paolo Scotton, Bradley G. Lide - "Blockchain and the Cloud: How Data Storage Could Change" Independently Published, 2019, ISBN: 978-1091043991.

For class presentations and discussions, the student should utilize journal and internet materials. Moreover, the course does not limit the use of learning materials available at BHOS library.

**Attendance**

The students are required to attend all classes as a part of their studies and those having legitimate reasons for absence (illness, family bereavement, etc.) are required to inform the instructor.

**Professionalism and Participation**

1. Attend class regularly, arrive on time, leave only when dismissed

2. Attend class with all materials required, be prepared to listen and work

3. Be well prepared for class, read all required materials, and complete all necessary preparation

4. Be attentive in class, take notes, contribute to discussion and ask intelligent questions

5. Demonstrate professional and respectful interpersonal relationships with peers and instructor: ATTITUDE COUNTS, AND whining is unacceptable

6. Take responsibility for your actions, and your results

**Plagiarism**

Honesty requires that any ideas or material taken from another source for written, visual, or oral use must be fully acknowledged. Offering the work of someone else as one’s own is plagiarism. The language or ideas thus taken from another may range from isolated formulas, images, sentences or paragraphs to entire articles copied from books, periodicals, speeches, or the writings and creations of other students. The offering of materials assembled or collected by others in the form of projects or collections without acknowledgment also is considered plagiarism. Any student who fails to give credit for ideas or materials taken from another course is guilty of plagiarism.

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| **Week** | **Topics** |
| 1 | **History of Cloud Technologies and Blockchain**   * Licklider’s “Intergalactic Computer Network” * ARPANET * Tim Berners-Lee’s World Wide Web * Historical review of Virtual Machines * Architecture of Virtual machines * History of Cloud Computing * History of Containers |
| 2 | **Introduction to Cloud Computing**   * Definition and Characteristics of Cloud Computing * Types of Clouds: Public, Private, Hybrid, Community * Cloud Service Models: IaaS, PaaS, SaaS * Benefits and Challenges of Cloud Computing * Case Studies of Cloud Adoption |
| 3 | **Cloud Service Providers and Architectures**   * Overview of Major Cloud Service Providers (AWS, Azure, Google Cloud) * Comparing Cloud Architectures and Services * Cloud Storage and Database Services * Cloud Computing Security Concerns and Best Practices * Scalability and Reliability in Cloud Services |
| 4 | **Advanced Cloud Technologies**   * Serverless Computing and its Impact * Cloud Orchestration and Management Tools * Cloud Analytics and AI Services * Cloud Networking and Content Delivery Networks * Future Trends in Cloud Computing |
| 5 | **Introduction to Blockchain Technology**   * Basics of Blockchain and Distributed Ledger Technology * Types of Blockchains: Public, Private, Consortium * Understanding Cryptography in Blockchain * Blockchain Consensus Algorithms * Blockchain and Data Integrity |
| 6 | **Blockchain Use Cases and Applications**   * Cryptocurrencies and Digital Wallets * Smart Contracts and Decentralized Applications (DApps) * Blockchain in Supply Chain Management * Use Cases in Identity Verification and Voting Systems * Blockchain in Healthcare and Record Keeping |
| 7 | **Blockchain in Cybersecurity**   * Enhancing Data Security Using Blockchain * Blockchain for Secure Transactions and Payment Systems * Preventing Fraud and Data Tampering * Blockchain in IoT Security * Challenges and Limitations of Blockchain in Cybersecurity |
| 8 | **Cloud Security Fundamentals**   * Understanding Cloud Security Architecture * Identity and Access Management in the Cloud * Data Encryption and Security Protocols * Compliance and Legal Issues in Cloud Security * Incident Response and Disaster Recovery in Cloud |
| 9 | **Advanced Cloud Security Solutions**   * Endpoint Detection and Response (EDR) in the Cloud * Extended Detection and Response (XDR) Solutions * Security Information and Event Management (SIEM) in the Cloud * Cloud Access Security Brokers (CASBs) * Security Automation and Orchestration in the Cloud |
| 10 | **Integrating Blockchain with Cloud for Enhanced Security**   * Blockchain as a Service (BaaS) * Enhancing Cloud Security with Blockchain Technologies * Use Cases of Blockchain in Cloud Storage Security * Decentralized Identity Management in Cloud * Future Trends and Research Areas in Blockchain-Cloud Integration |
| 11 | **Case Studies and Real-World Applications**   * Analyzing Real-World Implementations of Cloud Security Solutions * Blockchain Applications in Various Industries * Case Studies of Blockchain in Enhancing Cybersecurity * Emerging Technologies: AI and ML in Cloud and Blockchain * Industry Best Practices and Lessons Learned |
| 12 | **Outlook**   * Review of Key Concepts in Cloud and Blockchain for Cybersecurity * Discussion on Current Challenges and Future Trends * Potential Research Areas in Cloud and Blockchain Security |
|  | **Final Exam** |

**Instructor of the course \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Head of the department \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**