Module (Course Syllabus) Catalogue

2022-2023

College/ Institute	Erbil Technical Engineering	
Department	Information Systems Engineering	
Module Name	Future Network Architectures	
Module Code		
Degree	Technical Diploma ☐ Bachler ☐ High Diploma ☐ Master ☒ PhD ☐	
Semester	MSc - 2	
Qualification		
Scientific Title		
ECTS (Credits)	6	
Module type	Prerequisite ☐ Core ☒ Assist. ☐	
Weekly hours	3	Total Workload=(161) hrs
Weekly hours (Theory)	(3)hr Class	( )Total hrs Workload
Weekly hours (Practical)	( )hr Class	( )Total hrs Workload
Number of Weeks	15 Week	
Lecturer (Theory)	Prof. Dr. Shavan Askar	
E-Mail & Mobile NO.	Shavan.askar@epu.edu.iq	
Lecturer (Practical)		
E-Mail & Mobile NO.		
Websites		

Course Book

Course Description	As we move towards an increasingly connected and data-driven world, the landscape of network architectures is undergoing rapid evolution. This course delves into the latest advancements and emerging trends in network design and architecture, aiming to equip master's students with the knowledge and skills needed to navigate the complexities of future network infrastructures. The course begins by examining the foundational principles of networking, providing a comprehensive overview of traditional architectures such as client-server, peer-to-peer, and distributed systems. Building upon this foundation, students explore cutting-edge concepts and technologies shaping the future of networking, including Software-Defined Networking (SDN), Network Function Virtualization (NFV), and Intent-Based Networking (IBN). Through a combination of lectures, case studies, and hands-on exercises, students delve into key topics such as: 1. SDN and Network Programmability:** Understanding the principles of SDN, OpenFlow, and network programmability, and exploring how they enable centralized network management, agility, and flexibility. 2. NFV and Cloud Networking:** Exploring the virtualization of network functions and services, the convergence of networking and cloud computing, and the implications for scalability, resource optimization, and service delivery.

	3. Edge Computing and Fog Networking:** Investigating the shift towards decentralized computing architectures at the network edge, including fog computing, edge caching, and distributed processing, and their role in enabling low-latency, high-bandwidth applications. Throughout the course, students are encouraged to critically analyze real-world case studies, and participate in discussions on the ethical, social, and economic implications of future network architectures. By the end of the course, students will have gained a deep understanding of the principles, technologies, and challenges shaping the future of networking, empowering them to contribute to the design, deployment, and management of next-generation network infrastructures.
Course objectives	1. Comprehend the fundamental concepts and principles of Software-Defined Networking (SDN) and Network Function Virtualization (NFV) and their role in modernizing network architectures. 2. Explore the integration of Fog Computing and Edge Computing with traditional cloud architectures to support latency-sensitive and bandwidth-intensive applications in IoT and other domains. 3. Investigate the convergence of cloud computing and networking, understanding the challenges and opportunities presented by this integration in terms of scalability, resource allocation, and service delivery. 4. Analyze the impact of IoT (Internet of Things) on network architectures, including the challenges of managing massive numbers of interconnected devices, data processing at the edge, and ensuring security and privacy. 5. Develop practical skills through hands-on exercises and projects to implement and manage SDN/NFV solutions, deploy

	cloud and fog computing environments, and design network architectures tailored for IoT applications. 6. Critically evaluate the performance, security, and scalability considerations associated with SDN, NFV, fog computing, cloud computing, and IoT, and propose solutions to address emerging challenges in these areas.
Student's obligation	Students take active role in their learning process during their study period at the university. They are accountable for their academic success through making their own choice and take actions that lead them toward their educations goals. Student responsibilities could be expressed by the following points: 1- Attend and participate in classes and labs prepared and on time. You are responsible for what you miss- "I was absent" is not an excuse for not understanding the material or not being prepared for an assessment. 2- Demonstrate academic integrity and honesty. No matter how much stress you are under, it is expected that you will do your work with integrity and honesty. The consequences of violating the academic integrity are very serious and could lead to expulsion or suspension from the college. A- Plagiarism: trust your own ideas and conduct the work by yourself. Don't copy ideas or data without citing the source. It is not allowed to get someone do your work on your behalf. B- Cheating is not allowed: You are not allowed to copy answers from another student or ask another student to do your own work. Results' fabrication is not permitted too. Changing graded exams and submit them for a regrading is not allowed. C- Don't facilitate copying your answers, whether in an exam, project, or any sort of test to another student. 3- Do the home works, practice problems, re-solve all the examples and problems that were given in the class, submit your assignments\exercise problems on time with great attention to quality of work and intellectual property right (avoiding plagiarism). 4- Turn off your cell phone and put it away before class starts so you can focus on the class discussion and not cause a distraction for others. 5- Communicate in a careful and respectful manner with your instructors, colleagues, and other members of the college. 6- Respect diverse ideas and opinions. You will be exposed to a variety of viewpoints, values and opinions in the class that will differ from your own. All students in this class should feel comfortable expressing their

	viewpoints and concerns. You are an important part of creating an atmosphere that makes this possible. 7- Dedicate sufficient time to conduct self-study for the college work.
Required Learning Materials	You can expect your instructors to: • Attend every class period and arrive to class on time. • Learning tools will be data shows, lecture hand-outs and ppt. presentations, whiteboard explanation. • Online tools such as the university Moodle for submitting the reports and communicating with students. • Come to class with a good attitude.

Evaluation

	Task	Weight (Marks)	Due Week	Relevant Learning Outcome
	Paper Review	10		
Assignments	Homework			
	Class Activity	5		
	Report	5		
	Seminar			
	Essay			
	Project			
	Quiz	10		
	Lab.			
	Theory Midterm	20		
	Final Exam(theory)	50		
	Total	100		

Specific learning outcome:	
Course References:	**Internet Computing: Principles of Distributed Systems and Emerging Internet-Based Technologies by Ali Sunyaev**

Course topics (Theory)	**Week**	**Learning Outcome**
Modern Networks		
SDN Data Plane		

SDN Control Plane		
SDN Application Plane		
Cloud Computing Principles		
Cloud Computing		
Fog Computing		
IoT		
QoE		
Practical Topics	**Week**	**Learning Outcome**
Questions Example Design		
Extra notes:		
Signature		