

**ABDULLAH GÜL UNIVERSITY
INSTITUTE OF SCIENCE
ELECTRIC and COMPUTER ENGINEERING ANABİLİM DALI
INDIVIDUAL COURSE DESCRIPTION**

Course Title	Code	Semester	T+U Hours	Credit	ECTS
ARCHITECTURES OF CURRENT AND FUTURE INTERNET	ECE-510	SPRING	3+ 0	3	10

Prerequisites and co-requisites COMP 308 Computer Networks

Type	Elective
Language	English
Coordinator	Assist. Prof. Mehmet Şükrü Kuran
Instructor	Assist. Prof. Mehmet Şükrü Kuran
Adjunt	None
Aim	Explanation of the current and future Internet architecture will be given throughout the course. The main components and key mechanisms of the current Internet architecture like address resolution and routing will be investigated. Also, the Information Centric Networking (ICN), one of the key issues of the Future Internet paradigm will be discussed with its core concepts, potential architectures, and research directions
Learning Outcomes	<ol style="list-style-type: none"> 1. Learn the architecture of the past and current Internet 2. Understand how the addressing and address resolution mechanism works in the Internet 3. Understand how routing within autonomous systems, interior gateway protocols, work with a specific focus on the OSPF mechanism 4. Understand how routing between different autonomous systems, exterior gateway protocols, work with a specific focus on the BGP mechanism 5. Learn one of the key issues of the Future Internet paradigm, the Information Centric Networking (ICN) 6. Investigate various proposed ICN architectures 7. Investigate various open issues, research directions of the ICN as part of the Future Internet endeavor
Course Content	<ul style="list-style-type: none"> • Architecture, components, and actors of the past and current Internet • Circuit and Packet switching paradigms • Domain Name System (DNS) protocol for address resolution in Internet • Interior gateway routing algorithm, the Open Shortest Path First (OSPF) protocol • Exterior gateway routing algorithm, the Border Gateway Protocol (BGP) mechanism • Content Delivery Networks (CDN) and their architectures • Architecture of the Future Internet; the Information Centric Networking (ICN) • ICN Architectures – DONA • ICN Architectures – NDN • ICN Architectures – PURSUIT • Open issues, research topics, and recent trends in ICN research: Naming, routing, caching

WEEKLY TOPICS AND PRELIMINARY STUDY

Week	Topics	Preliminary Study
1	History of the Internet: The origin of the Internet, the ARPANet will be discussed. Also internet regulating bodies like IETF, their roles and responsibilities will be mentioned. The features of and differences between Circuit switching and Packet Switching paradigms will be explained.	
2	Current Internet Architecture, Addressing and Address Resolution Mechanism: Current architecture of the Internet, the autonomous systems and their interactions will be explained. Also, the main address resolution mechanism of the Internet, the Domain Name System (DNS) protocol will be explained in detail.	

3	Fundamentals of Graph Theory: Basic aspects of graph theory (i.e., components, features) will be revisited as a preliminary material for understanding routing algorithms.	
4	Interior Gateway Routing in Current Internet: The main routing algorithm, Open Shortest Path First (OSPF) that is widely used inside Autonomous Systems will be explained.	
5	Exterior Gateway Routing in Current Internet: The main routing algorithm, Border Gateway Protocol (BGP) that is widely used between Autonomous Systems will be explained.	
6	Contemporary Internet Usage & Content Delivery Networks: Current internet usage patterns and the changing aspects of various prevalent content types on Internet will be discussed. Based on these facts, the reasoning behind the need for overlay networks like Content Delivery Networks (CDNs) will be explained. Their internal mechanisms, advantages and disadvantages will be investigated.	
7	Midterm Exam	
8	Information Centric Networking: A proposed architecture for accommodating the new Internet traffic load and structure, the Information Centric Networking – ICN, will be discussed with its key features and concepts.	
9	ICN Architectures: One of the contemporary prevalent ICN proposals, the Data Oriented Network Architecture (DONA), will be explained in detail.	
10	ICN Architectures (Continued): One of the contemporary prevalent ICN proposals, the Named Data Network (NDN), will be explained in detail.	
11	ICN Architectures (Continued): One of the contemporary prevalent ICN proposals, the Publish-Subscribe Internet Technology (PURSUIT), will be explained in detail. Architecture	
12	Research topics and Open Issues in ICN: Various other ICN architecture proposals in the literature such as SAIL, COMET, CONVERGENCE, and Mobility First will be investigated.	
13	Research topics and Open Issues in ICN (Continued): Key proposals in the literature regarding the Naming and Addressing mechanisms of the ICN architecture will be investigated.	
14	Research topics and Open Issues in ICN (Continued): Key proposals in the literature regarding the Routing mechanism of the ICN architecture will be investigated.	
15	Research topics and Open Issues in ICN (Continued): Key proposals in the literature regarding the Caching mechanism of the ICN architecture will be investigated.	
16	Final Exam	

SOURCES	
Lecture Notes	Lecture slides
Other Sources	Course Textbook:
	Additional Materials
	1. "Information Centric Networking: A New Paradigm for the Internet", de Brito, 1st Edition, 2013, Wiley
	2. "BGP", Van Beijnum, 1st Edition, 2002, O'Reilly Media
	3. "DNS and BIND", Liu, 5th Edition, 2006, O'Reilly Media

COURSE MATERIALS SHARING	
Documents	
Homeworks	
Exams	1 Midterm Exam and 1 Final Exam

EVALUATION SYSTEM		
SEMESTER STUDY	NUMBER	CONTRIBUTION
Midterm Exam	1	30
Project Homework	1	30
Quiz	2	10
Final Exam	1	30
Contribution of Semester Study		70
Contribution of Final Exam		30
TOTAL		100

Course Category	
Sciences and Mathematics	%20
Engineering	%80
Social Sciences	%

RELATIONSHIPS BETWEEN LEARNING OUTCOMES AND PROGRAM QUALIFICATIONS						
No	Program Qualifications	Contribution Level				
		1	2	3	4	5
1	The skills of using mathematics, science and engineering information in advanced research			X		
2	The skills of analyzing, designing and/or implementing an original system that will be able to solve an engineering problem,				X	
3	The skills of using the required software, hardware and modern measurement equipments in their field of research,					X
4	The skills of planning independent research and implementing in detail,					X
5	The skills of following literature, listening to and making technical presentation, writing a paper in academic level,					X
6	The skills of innovative and interrogative thinking and finding original solutions			X		

Increasing from 1 to 5

ECTS/ WORK LOAD TABLE			
Activities	Number	Duration (Hours)	Total Work Load
Course Length (includes exam weeks: 16x total course hours)	16	3	48
Out of class study time (pre-study, practice)	14	2	28
Internet search, library work, literature search	1	19	19
Presentation	2	15	30
Homework	4	7.5	30
Midterm Exam	1	30	30
Final Exam	1	40	40
Total Work Load			225

Total Work Load/ 30			7.5
Course ECTS Credit			7.5