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| **Identification** | **Subject**  | **CMS 521 - Advanced Computer Networks / 6 credits**  |
| **Department** | Computer Science |
| **Program** | Undergraduate |
| **Term** | Fall, 2017 |
| **Instructor** | Rasim Abdullayev |
| **E-mail:** | **vuna172@gmail.com****;**  |
| **Phone:** | **(+99455) 208-55-19; (+99470) 315-19-30;** |
| **Classroom/hours** | 11 Mehseti str. (Neftchilar campus), Room #401N, Friday 1810 – 1930 1940 - 2100 |
|  | **Office hours** |  |
| **Prerequisites** | **CMS 309** - Computer Networks and Communications;  |
| **Language**  | English |
| **Compulsory/Elective** | Required |
| **Required textbooks and course materials** | Core Textbook: 1. Data Communications and Computer Networks: A Business User’s Approach, Seventh Edition Curt M. White, 2014;
2. Todd Lammle - CCNA Routing and Switching Study Guide – 2013;
3. James F. Kurose and Keith W. Ross , Computer Networking - A Top-Down Approach Featuring the Internet, 6th Edition , 2012 Addison Wesley;
4. From GSM to LTE-Advanced - An introduction to mobile networks and mobile broadband. Revised 2nd edition [Martin Sauter] 2014
5. Andrew S. Tanenbaum, Computer Networks, 5-th Edition,. Prentice Hall, 2011;
6. Voice over LTE (VoLTE) [Miikka Poikselkam et al.] 2012
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| **Course outline** | This course introduces the underlying concepts and principles of advanced computer networks. It presents the different components of a network and how these components fit together. This course discuss fundamentals of computer networks, the various advanced protocols and technologies, The course emphasizes the design and implementation of network software that transforms raw hardware into a richly functional communication system. Real networks are used as examples to reinforce the concepts and demonstrate various protocols. |
| **Course objectives**  | Introduction to analysis and design of computer and computer networks through understanding the network layered architecture and the protocol stack and by conducting hands-on programming and lab activities. |
| **Learning outcomes** | By the end of the Course students should be able:* Be familiar with the different Network Models.
* Understand different network technologies
* Understand the effects of using different networking topologies
* Be updated with different advanced network technologies that can be used to connect different networks
* Be familiar with various hardware and software that can help protect the network
* Know the advantage of using a network management system
* Practical skills to configure and manage network devices
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| **Teaching methods** | **Lecture**  | x |
| **Group discussion** | x |
| **Experiential exercise** | x |
| **Simulation** | x |
| **Case analysis** | x |
| **Course paper** |  |
| **Others** | x |
| **Evaluation**  | **Methods** | **Date/deadlines** | **Percentage (%)** |
| **Midterm Exam** |  | 30 |
| **Case studies** |  |  |
| **Class Participation** |  | 10 |
| **Assignment and quizzes** |  |  |
| **Project** |  | 15 |
| **Laboratory work** |  | 15 |
| **Final Exam** |  | 30 |
| **Others** |  |  |
| **Total**  |  | 100 |
| **Policy** | * **Preparation for class**

The structure of this course makes your individual study and preparation outside the class extremely important. The lecture material will focus on the major points introduced in the text. Reading the assigned chapters and having some familiarity with them before class will greatly assist your understanding of the lecture. After the lecture, you should study your notes and work relevant problems and cases from the end of the chapter and sample exam questions.Throughout the semester we will also have a large number of review sessions. These review sessions will take place during the regularly scheduled class periods. * **Withdrawal (pass/fail)**

This course strictly follows grading policy of the School of Economics and Management. Thus, a student is normally expected to achieve a mark of at least 60% to pass. In case of failure, he/she will be required to repeat the course the following term or year. * **Cheating/plagiarism**

Cheating or other plagiarism during the Quizzes, Mid-term and Final Examinations will lead to paper cancellation. In this case, the student will automatically get zero (0), without any considerations.* **Professional behavior guidelines**

The students shall behave in the way to create favorable academic and professional environment during the class hours. Unauthorized discussions and unethical behavior are strictly prohibited. |
| **Tentative Schedule** |
| **Week** | **Date/Day****(tentative)** | **Topics** | **Textbook/Assignments**  |
| 1 | 15.09.17 | **Course information overview;****Introduction to Computer Networks;**  **International standards. Open systems interconnect (OSI). Network protocols.** Layered communication architecture: layers,services, protocols, layer entities, service accesspoints, protocol functions | Chap. 1[1], 1[2]Chap.3[3],1[2] |
| 2 | 22.09.17 | **Network layer addressing and forwarding;****IP addressing** * IPv4;
* VLSM;
* CIDR;
* Summarization
* IPv6
 | Chap. 3[2], 5[5] |
| 3 | 29.09.17 | **Application Layer** * **Services and protocols**

Transport Layer* Transport Services and Mechanism
* TCP/UDP

Network Layer | Part. 6[1]Part. 4, 5[1] |
| 4 | 06.10.17 | **Introduction to routing and Packet Forwarding*** Static routing
 | Chap. 4[5], 8[2] |
| 5 | 13.10.17 | **Introduction to Dynamic Routing Protocols*** Link-Sate Routing Protocols
* Distance Vector Routing Protocols
 | Chap. 8,9[2] |
| 6 | 20.10.17 | **Advanced Routing algorithms –** OSPF | Chap. 9[2], 5[5] |
| 7 | 27.10.17 | **Basic Switching and Virtual LAN Concepts*** Vlans;
* VTP;
* STP;
* Inter Vlan Routing
 | Chap. 11[2] |
| 8 | 03.11.17 | **Midterm Exam** |  |
| 9 | 10.11.17 | Advanced Routing algorithms - BGP  | Chap. 4[1], 5[5] |
| 10 | 17.11.17 | Services models: integrated services, differentiated services, proportional services, and besteffort services MPLS and VPN | Chap. 5[3]  |
| 11 | 24.11.17 | Multimedia and QoS-aware communications for IP networks; Quality of service  | Chap. 7[3] |
| 12 | 01.12.17 | Congestion control and avoidance mechanisms; Advanced Network Congestion Control algorithms | Chap. 3[3] |
| 13 | 08.12.17 | **Wireless and Mobile Networks** * Cellular Networks: GSM, UMTS
* Interfaces, protocols
 | Chap. 6[3], 1,4[4] |
| 14 | 15.12.17 | **LTE and VoLTE** technology and conceptsInterfaces, protocols and  | Chap. 3,4 [6] |
| 15 | 22.12.17 | **Project presentation** |  |
|  | TBA | **Final Exam** |  |

This syllabus is a guide for the course and any modifications to it will be announced in advance.