

**MODULE SPECIFICATION**

<b>Name of Module</b>		Networks and Telecommunications					
<b>Parent School/Dept</b>		Computer Science/Information Systems					
<b>Programme(s) where module is offered</b>		BSc Computer Science with Electrical Engineering; BSc Computer Science with Economics; BSc Computer Science with Business; BSc Computer Science with International Relations; BSc Computer Science with Political Science; BSc Information Systems with Electrical Engineering; BSc Information Systems with Economics; BSc Information Systems with Business; BSc Information Systems with International Relations; BSc Information Systems with Political Science;					
<b>Status</b> (core, option, free choice)		Core		<b>Pre-Requisite Modules or Qualifications</b>		none	
<b>FHEQ Level</b>	Level 4	<b>Unit Value</b>	6 ECTS	<b>Module Code</b>	CS235	<b>Module coordinator</b>	Dr. Darko Sinanovic
<b>Term taught</b>		Fall		<b>Applicable From</b>		2016	

**Educational Aims of the Module**

The aim of the module is to introduce students to the concepts, techniques and practices of Computer Networking and Telecommunications. The intent is to make the students learn the basic concepts of layered network architecture, topologies, protocols, transmission principles, etc., to learn the main tasks of each layer and their methods of accomplishing the tasks, and to ensure students have knowledge of most common protocols in a layered network architecture and their use in today's networks.

The module also gives good coverage of addressing and designing LAN networks and subnets.

The aim is to provide an understanding of a variety of networking-related concepts and their relationships, so future engineers can prepare themselves for successful planning, design, analysis, programming, and maintenance of computer networks. To learn IT job skills, i.e. how to configure equipment, it's not a module goal, but hands-on tools will be used in labs to deepen students' understanding of protocols covered in module and designing LAN networks.

**Module Outline/Syllabus**

- Basics of Networking: Introduction to Network applications; Network hardware and software; Types of networks; Network topologies; Architecture of Internet; OSI/ISO and TCP/IP model; Example networks: PSTN, Ethernet, xDSL, Cable
- Physical layer: Transmission media and connectors; Introductions to signals, Bandwidth Nyquist's theorem, Modulation and Multiplexing; Introduction to switching
- Data Link Layer: Framing; Error and Flow control; Error codes; ARQ
- The Medium Access Control Sublayer (MAC): Resource allocation; Multiple access protocols; Collision detection and avoidance; LAN technologies: Ethernet and WiFi; Devices and switching; Collision domains; Backward learning and Spanning tree
- Network layer: Connection-oriented vs. Connectionless services; Internetworking; IP: addressing v4 and v6; masks and subnetting; NAT, ARP, ICMP, DHCP; Routing algorithms and protocols; Congestion control and QoS;
- Transport layer: Ports; Error and Flow control; TCP; 3-way handshake; UDP; Congestion Control;
- Application layer: DNS; Mail (POP3, SMTP, MAP); Web (HTTP, HTTPS); Streaming multimedia, Content delivery

**Student Engagement Hours**

Type	Number per Term	Duration	Total Time
Lectures	30	2 hours	60 hours
Laboratory sessions	15	2 hours	30 hours
Total Guided/Independent Learning Hours			<b>60</b>
Total Contact Hours			<b>90</b>
<b>Total Engagement Hours</b>			<b>150</b>

**Assessment Method Summary**

Type	Number Required	Duration / Length	Weighting	Timing/Submission Deadline
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Final Exam	1	180 minutes	50%	End of semester
Mid-term exam	1	90 minutes	20%	Mid-semester
Lab + homework assignment	4	1,500 words	12%	Every 2-3 weeks
Project (Group)	1	2,000 words	10%	Week 14
Quiz	2	60 minutes	8%	Twice in semester

<b>Module Outcomes</b>		
<p><b><u>Intended Learning Outcomes:</u></b></p> <ol style="list-style-type: none"> <li>Understanding the concept of computer and communications networks as large-scale systems</li> <li>Understanding organization of network functions in a layered architecture</li> <li>Understanding practical aspects of communications protocols</li> <li>Network devices and their layers</li> <li>Addressing and designing networks and subnets</li> <li>Understanding how basic network applications work</li> </ol>	<p>→</p>	<p><b><u>Teaching and Learning Strategy:</u></b></p> <ol style="list-style-type: none"> <li>Lectures on module material (ILO:1-6)</li> <li>Practical problems and laboratory sessions with appropriate tools and practice problems (ILO:4,5)</li> <li>Individual lab assignments to integrate theoretical concepts with practical skills (ILO:3-6)</li> </ol>
	<p>→</p>	<p><b><u>Assessment Strategy</u></b></p> <ol style="list-style-type: none"> <li>Quiz (ILO:1-3)</li> <li>Mid-term exam (ILO: 1-3)</li> <li>Lab + homework assignment (ILO: 3-6)</li> <li>Project (group) (ILO:1-6)</li> <li>Final exam (ILO:1-6)</li> </ol>
<p><b><u>Practical Skills</u></b></p> <ol style="list-style-type: none"> <li>Breaking down complexity of network design for ease of understanding and application</li> <li>Hands-on experience with real network traffic</li> <li>Use of software tools for packet analysis</li> <li>Creating a small LAN network</li> <li>Setting-up basic network applications</li> </ol>	<p>→</p>	<p><b><u>Teaching and Learning Strategy:</u></b></p> <ol style="list-style-type: none"> <li>Laboratory sessions with tutor-lead support (PS: 1-5)</li> <li>Individual assignments (PS: 1-4)</li> <li>Group Project assignment (PS: 5)</li> </ol>
	<p>→</p>	<p><b><u>Assessment Strategy</u></b></p> <ol style="list-style-type: none"> <li>Mid-term exam (PS: 1,4)</li> <li>Final exam (PS: 1-5)</li> <li>Lab + homework assignment (PS: 2-5)</li> <li>Project (group) (PS:1-5)</li> </ol>
<p><b><u>Transferable Skills</u></b></p> <ol style="list-style-type: none"> <li>Application of theory to practice</li> <li>Ability to use own initiative</li> <li>Planning and time management skills</li> <li>Working in a network project</li> </ol>	<p>→</p>	<p><b><u>Teaching and Learning Strategy:</u></b></p> <ol style="list-style-type: none"> <li>Note taking at lectures &amp; elsewhere (TS:2,3)</li> <li>Lab exercises and tutorials (TS:1-3)</li> <li>Individual assignments (TS:1-3)</li> <li>Group Project assignment (TS: 1-4)</li> </ol>
	<p>→</p>	<p><b><u>Assessment Strategy</u></b></p> <ol style="list-style-type: none"> <li>Lab + homework assignment (PS: 1-4)</li> <li>Project (group) (PS:1-4)</li> </ol>

<b>Key Texts and/or other learning materials</b>
<p>Recommended Text:</p> <ul style="list-style-type: none"> <li>Andrew Tanenbaum: Computer Networks, fifth edition, Pearson, ISBN-13: 978-1-29202-422-6</li> <li>Cisco learning materials available online</li> </ul> <p>Additional Reading:</p> <ul style="list-style-type: none"> <li>Kurose and Ross: Computer Networking: A Top-Down Approach, 6/e, Pearson, ISBN-13: 9780132856201</li> <li>Behrouz A. Forouzan: Data Communications and Networking, McGraw-Hill Science/Engineering/Math; 5<sup>th</sup> edition; ISBN-13: 978-0073376226 with corresponding presentations available online</li> <li>Barrie Sosinsky: Networking Bible, first edition, Wiley, ISBN-13: 978-0470431313</li> <li>Articles related to networks and telecommunications in International Journals (IEEE, Elsevier, ACM, JSCSE)</li> </ul> <p><b>Please note:</b> This specification provides a concise summary of the main features of the module and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes,</p>

content and teaching, learning and assessment methods of each module and programme can be found in the departmental or programme handbook. The accuracy of the information contained in this document is reviewed annually by the University of Buckingham and may be checked by the Quality Assurance Agency.

<b>Date of Production</b>	Autumn 2016
<b>Date approved by School Learning and Teaching Committee</b>	28 <sup>th</sup> September 2016
<b>Date approved by School Board of Study</b>	12 <sup>th</sup> October 2016
<b>Date approved by University Learning and Teaching Committee</b>	2 <sup>nd</sup> November 2016
<b>Date of Annual Review</b>	December 2017