COURSE OUTLINE

(1) GENERAL

SCHOOLS	**ENGINEERING, NATURAL SCIENCES**
ACADEMIC UNIT/UNITS	**COMPUTER ENGINEERING AND INFORMATICS DEPARTMENT, DEPARTMENT OF MATHEMATICS**
TITLE OF MASTER'S DEGREE	*MSC in Data Driven Computing and Decision Making*
LEVEL OF STUDIES	Post graduate

COURSE CODE	**DDCD109**		**SEMESTER**	**1**
COURSE TITLE	Quality of Service in Networks			

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*		**WEEKLY TEACHING HOURS**	**CREDITS**
	Lectures	3	7.5
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).	Total		7.5

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Specialised general knowledge,
PREREQUISITE COURSES:	Recommended prerequisite knowledge on Telecommunications and Networks such as, Networks, Broadband Technologies, Public Networks and Internetworking
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	http://ru6.cti.gr/ru6/bouras/graduate-courses/mhxanismoi-poiothtas-uphresias?language=el e-class: https://eclass.upatras.gr/courses/CEID1103/

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A
- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

Upon completion of the course, students will be able to:
- Be aware of the concept of quality of service
- Be aware of quality service mechanisms.

- Familiarize yourself with SLAs
- Be able to design quality service mechanisms
- Know all the techno-economic and legal issues of a SLA

Upon completion of the course the students will have developed the following skills:
1. Be able to choose the appropriate service quality mechanism
2. Have the ability to design a quality service mechanism
3. Be able to design and manage SLA

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
	Respect for difference and multiculturalism
	Respect for the natural environment
Adapting to new situations	*Showing social, professional and ethical*
Decision-making	*responsibility and sensitivity to gender issues*
Working independently	*Criticism and self-criticism*
Team work	*Production of free, creative and inductive*
Working in an international environment	*thinking*
Working in an interdisciplinary environment	*……*
	Others…
Production of new research ideas	*…….*

- Search, analyze and synthesize data and information, using the necessary technologies
- Adjustment to new situations
- •Decision making
- Promote free, creative and inductive thinking

(3) SYLLABUS

Introduction to Quality of Service
Quality of service at the physical and data interconnection level
Network Service Quality
The IntServ Architecture
Description of architecture and its mechanisms
The DiffServ Architecture
Description of architecture and its mechanisms
Developed QoS services
IP Premium service
Service Less than Best effort
Managed Capacity Service
Introduction to Bandwidth Brokers
Applications adaptable to transmission according to network status
Introduction to Service Charges
Analysis and description of service costs
Existing billing models and their critical approach
Description of Service Quality Assurance Contracts (SLAs)
Introduction to the topic and methodology of developing such contracts
SLA types and performance metrics
SLA connection description for debit issues in QoS services

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning,*	Face-to-face

	etc.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	The slides of the course and additional auxiliary material are available from the website to the enrolled students

TEACHING METHODS *The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*		
	Activity	*Semester workload*
	Lectures	13 X 3 =39
	Self-study	13 X 3 = 39
	Study Weekends	13 X 5 = 75
	Exam preparation week + 2 weeks of vacation	3 X 11 = 33
	Course total	*186*

STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Language of evaluation: Greek Final examination (100% of total score). Written, graduated difficulty, covering all matter There is the possibility of optional bibliographic work as a technical reference. All papers are posted on the course's website. They contribute 10% to the final score.

(4) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:
PRINCIPLES AND APPLICATIONS OF ELECTRICAL ENGINEERING, G. Rizzoni and J. Kearns SIXTH EDITION, McGraw-Hill Education
MICROELECTRONIC CIRCUITS, A.S. Sedra and K.C. Smith, SEVENTH EDITION, Oxford University Press
- Related academic journals:

Books

• IP Quality of Service: the complete resource for understanding and deploying IP   Vegesna S.

Quality of Service for Cisco networks, Cisco Press, 2001

• Advanced MPLS Design and Implementation, Cisco Press ISBN 158705020X	Vivek Alwin
• Pricing Communication Networks, John Wiley & Sons Ltd., West Sussex, England, 2003	Courcoubetis C., Weber R.
• Internet Economics, MIT Press, Cambridge, Massachusetts, U.S.A., 1997	McKnight L., Bailey J. (eds.)
• Service Level Agreement in the Data Center, Sun BluePrints OnLine, April 2002	Wustenhoff E.
• Pricing and Cost Recovery for Internet Services: Practical Review, Classification, and Application of Relevant Models, version published in Netnomics, Vol.	Stiller B., Reichl P., Leinen S.
• Understanding Networked Multimedia	Fluckiger F.
• Internetworking Technologies Handbook	Ford M., Lew H. K., Spanier S., Stevenson T.
• A Guide for Establishing Service Level Specifications foe Outsourcing Relationships	Goolsby K.
• A Reliable Adaptive Network Protocol for Video Transport	Goyal P., Vin H., Shen C., Shenoy P.
• Internet Pricing and the History of Communications	Odlyzko A.
• Data and Computer Communications	Stallings W.
• TCP / IP Illustrated, Volume 1: The Protocols	Stevens W.
• Foundations of Service Level Management	Sturm R., Morris W., Jander M.
• Multimedia Networking	Szuprowicz B.

RFC

• RFC 2475, An Architecture for Differentiated Services, IETF	S. Blake, D. Black, M. Carlson, E. Davies, Z. Wang, W. Weiss
• RFC 2597, Assured Forwarding PHB Group, IETF	J. Heinanen, F. Baker, W. Weiss, J. Wroclawski
• RFC 2598, An Expedited Forwarding PHB", IETF	V. Jacobson, K. Nicholsm K.Poduri
• RFC 2210, The Use of RSVP with IETF Integrated Services, IETF	J. Wroclawski
• RFC 2205, Resource ReSerVation Protocol (RSVP) - Version 1 Functional Specification, IETF	R. Braden, L. Zhang, S. Berson, S. Herzog, S. Jamin
• RFC 1633, Integrated Services in the Internet Architecture: an Overview	R. Braden, D. Clark, S. Shenker
• RFC 1889, RTP: A Transport Protocol for Real - Time Applications	H. Shculzrinne, S. Casner, R. Frederick, V. Jacobson
• RFC 1890, RTP Profile for Audio and Video Conferences with Minimal Control	H. Shculzrinne, S. Casner
• RFC 2211, Specification of the Controlled-Load Network Element Service	J.Wroclawski
• RFC 2212, Specification of the Guaranteed Quality of Service	S.Shenker, R.Guerin
• RFC 2474, Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers	K. Nichols, S. Blake, F. Baker, D. Black
• RFC 2481, A proposal to Add Explicit Congestion Notification (ECN) to IP	K.Ramakrishman and S.Floyd
• RFC 2697, A single rate three color marker	J. Heinanen, R. Guerin
• RFC 2698, A Two Rate Three Color Marker	J. Heinanen, R. Guerin
• RFC 2857, A Time Sliding Window Three Color Marker (TSWTCM)	W. Fang, N. Seddigh
• RFC 3697, IPv6 Flow Label Specification	J. Rajahalme, A. Conta, B. Carpenter and S. Deering