COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL of ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**EEE.9-2.3**	SEMESTER	9th
COURSE TITLE	Electromagnetic Compatibility		
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	
	Lab exercises	1	
	Total	4	5
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Special Background		
PREREQUISITE COURSES:	EEE.4-5: Electromagnetic Fields II, EEE.7-2.2: Microwaves, EEE.8-2.2: Antennas		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	eee.uniwa.gr		

(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*

The object of the course is to introduce students to modern devices and systems specifications according to which, there is a maximum level of emitted interference and a minimum immunity level against interference. The course focuses on the available international standards and regulations, while at the same time it describes the methodology and instrumentation for testing the EMC of the devices. Furthermore, the course focuses on shielding theory and techniques for the device and cable electromagnetic isolation as well as the design of grounding. Additionally, and apart from the study of interference (conductive or radiated) caused by man-made sources, natural interference sources, such as lightning signals, are analyzed and presented.

Upon successful completion of the course, students will be able to:

- explain the role of EMC standards and regulations
- handle the required instrumentation and testing of devices for the implementation of basic EMC tests
- calculate shielding attenuation and design shielding structures for various HM interference sources
- calculate the capacitive and inductive coupling between cables
- design conductive interference rejection circuits

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*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

- Showing social, professional and ethical responsibility and sensitivity to gender issues
- Production of free, creative and inductive thinking
- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Decision-making
- Working independently
- Teamwork
- Criticism and self-criticism
- Production of free, creative and inductive thinking

(3) SYLLABUS

1. EMC principles and definitions - Standards and Regulations

2. EMC testing (conductive & radiated emission tests, immunity tests)
3. Open Field - Anechoic Chamber - Reverberation Chamber and TEM Cells.
4. Design features and specifications of anechoic chambers
5. Shielding effectiveness: Near and far field effects.
6. Shielding effectiveness: Absorption losses - Reflection losses - Multi reflection correction factor
7. Shielding effectiveness: Reduction of Shielding Effectiveness through openings and slots – Resonant cavity effects
8. E/M Wiring Protection: Capacitive Coupling
9. E/M Wiring Protection: Inductive Coupling
10. E/M Protection & Cables - Twisted Pairs - Coaxial Cables
11. Conductive interference: Electrostatic discharge - Electrical transient phenomena - Lightning currents - General principle of operation of protection circuits
12. Grounding of systems and appliances: Grounding categories - AC supplies and ground connections
13. Grounding of signals - Grounding of systems and devices - Grounding loops – chocks

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of ICT for Electromagnetic simulation
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*	
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.*	I. Written exams (80% or 100%): - multiple choice questionnaires - short-answer questions - problem solving II. Optional written work, essay/report (20%)

Activity	*Semester workload*
Lectures	39
Study and analysis of bibliography	98
Lab exercises	13
Course total	***150***

(5) ATTACHED BIBLIOGRAPHY

- Chatterton P., Houlden M., Electromagnetic Compatibilty (EMC), Εκδ. Τζιόλα 2000.
- H.W.Ott, EMC engineering, Wiley, 2009.
- C.R.Paul, Introduction to Electromagnetic Compatibility, Wiley, 2006.
- D. Morgan, A Handbook for EMC Testing and Measurement (IET Electrical Measurement Series), 2007.