ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
Α .Δ Ι .Π .
ΑΡΧΗ ΔΙΑΣΦΑΛΙΣΗΣ & ΠΙΣΤΟΠΟΙΗΣΗΣ
ΤΗΣ ΠΟΙΟΤΗΤΑΣ ΣΤΗΝ ΑΝΩΤΑΤΗ
ΕΚΠΑΙΔΕΥΣΗ

HELLENIC REPUBLIC
H .Q .A .
HELLENIC QUALITY ASSURANCE
AND ACCREDITATION AGENCY

ΤΕΧΝΟΛΟΓΙΚΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΙΔΡΥΜΑ ΑΝΑΤΟΛΙΚΗΣ ΜΑΚΕΔΟΝΙΑΣ ΚΑΙ ΘΡΑΚΗΣ
ΜΟΝΑΔΑ ΔΙΑΣΦΑΛΙΣΗΣ ΤΗΣ ΠΟΙΟΤΗΤΑΣ ΤΕΙ ΑΜΘ

Quality Assurance in Higher Education
Course Data Collection Form

ΤΕΧΝΟΛΟΓΙΚΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΙΔΡΥΜΑ
ΑΝΑΤΟΛΙΚΗΣ ΜΑΚΕΔΟΝΙΑΣ & ΘΡΑΚΗΣ
ΑΓΙΟΣ ΛΟΥΚΑΣ,
65404 ΚΑΒΑΛΑ

EASTERN MACEDONIA AND THRACE
INSTITUTE OF TECHNOLOGY
AGIOS LOUKAS
65404 KAVALA

COURSE OUTLINE

1. GENERAL

SCHOOL	School of Technological Applications		
ACADEMIC UNIT	Department of Electrical Engineering		
DEGREE LEVEL	Undergraduate		
COURSE CODE	ΓΝ6	**SEMESTER**	3st
COURSE TITLE	Methods of Material Characterization		

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	2	3
Add rows if necessary. The organization of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	specialised general knowledge,
Required passed courses:	-
TEACHING AND EXAMS LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS:	Yes
COURSE WEBPAGE (URL)	http://eclass.teikav.edu.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 Materials Characterization Course introduces the student to the most advanced and modern materials characterization techniques and is a complement to the undergraduate course "Materials Technology". The characterization of the materials includes the structural, optical thermal and electrical characterization. Emphasis is given to X-ray techniques, optical and electron microscopy in thermal analysis. At the same time, techniques are applied for the electrical characterization of conductors , insulators and semiconductors

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

Understand the importance of the structure of materials in relation to their function and physical properties.

- Have a complete picture of the capabilities and fields of application of optical characterization techniques (Spectroscopy, Ellipsoid, Optical Microscopy, Electronic Microscopy)
- To deepen the thermal characterization of materials
- To characterize materials in terms of their magnetic properties (Diamagnetism, Paramagnetism, Ferromagnetism, Magneto resistance).
- To highlight the electrical properties in DC and AC. Determine the specific electrical resistance and dielectric strength of dielectrics.

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*
	Respect for the natural environment

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

- Research, analysis and synthesis of data and information with the usage of the necessary technology.
- Autonomous work.
- Teamwork.
- Work in a scientific environment.
- Apply critisicm and self-critisicm.
- Promote of free, creative and inductive thinking.

3. COURSE CONTENT

Introduction to the crystal structure
• X-rays
• Characterization of X-ray materials
• Characterization of Materials with Optical Methods
Absorption - reflectivity coefficients
•Refractive index
• Ellipsometry
• Introduction to Optical Microscopy
• Polarized Microscope
• Characterization of Materials by Optical Microscopy
• Introduction to Electronic Microscopy
• Electronic Microscopy TEM
• Electronic Microscopy SEM
• Characterization of Materials by Electron Microscopy
• Introduction to thermal analysis
• Differential thermal analysis (DTA)
• Differential scanning calorimetry (DSC)
• Characterization of Materials with thermal analysis
• Characterization of Magnetic Materials
• Diamagnetic, Paramagnetic, Ferromagnetic
• Magnetometer
• Magnetic resonance
• Introduction to Electrical Characterization of Materials
• Determination of other qyantities (dimensions, heterogeneities) by electrical properties.
• Determination of electrical conductivity of metals and alloys
• Special Resistance Measurements
• Characterization of semiconductor materials
• Type of conductivity
• Anisotropy
• Methods for characterizing crystalline and polycrystalline semiconductor and semiconductor devices
• Characterization of Insulating Materials
• Methods for determination of electrical resistance and dielectric strength
• Dielectric constant
• Piezoelectricity

4. TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD *Face-to-face, Distance learning, etc.*	Room Lecture
UTILISATIONS OF INFORMATION AND COMMUNICATION TECNOLOGIES	Syllabus organization in PPT slides. Learning process support through e-class electronic Contact via email.

Use of ICT in teaching, laboratory education, communication with students	
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 ASSESSMENT *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.*	Writing of small courseworks (10%). Exams (90%) consisting of mathematic problems from various units of the course (Note usage is not allowed).

Acivity	***Semester workload***
Lectures	70
Writing of small courseworks	
	10
Self-contained coursework	10
Course Summary (25 workload per credit)	90

5. RECCOMENDED READING

- Suggested bibliography:
- Related academic journals:

Τεχνολογία υλικών ,Λ. Μαγκαφάς,Μ. Χανιάς, Εκδόσεις Τζιόλα,2017

-Materials Characterization Techniques, Sam Zhang, Lin Li, Ashok Kumar (2008) CRC Press.

- Physical Methods for Materials Characterisation, Peter E.J. Flewitt, R.K. Wild (2003) CRC Press.

-Magnetism and Magnetic Materials J. M. D. Coey (2010) Cambridge University Press.

-Electron Paramagnetic Resonance of Transition Ions A. Abragam, B. Bleaney (2012) Reprint edition Oxford University Press.

- Transmission Electron Microscopy Physics of Image Formation Reimer, L., Kohl, H., (2008) Springer Series in Optical Sciences

-Materials Characterization: Introduction to Microscopic and Spectroscopic Methods, Yang Leng, Wiley & Sons; 1st Edition, June 2008.