ΜΟΝΑΔΑ ΔΙΑΣΦΑΛΙΣΗΣ ΠΟΙΟΤΗΤΑΣ Α.Π.Θ.

Surfaces and Interfaces and Thin-Film Materials Science

1. GENERAL			
SCHOOL	Faculty of Sciences in collaboration with Faculty of Engineering, Aristotle University of Thessaloniki		
DEPARTMENT	Materials Science and Engineering		
LEVEL OF STUDIES	ISCED level 7 (5-year Integrated Master's programme) ISCED level 6 (4-year BSc programme)		
COURSE CODE	**MSEN 721**	**SEMESTER**	7th Semester
COURSE TITLE	**Surfaces and Interfaces and Thin-Film Materials Science**		
TEACHING ACTIVITIES Lectures, tutorials/problem sessions, laboratory/computer exercises (where applicable), case studies and guided self-study.		**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
		4	6
COURSE TYPE	This course explores the fundamental principles and applications of surfaces, interfaces, and thin-film materials in engineering. Topics include surface energy, adsorption, wetting, interface phenomena, thin-film growth techniques, characterization methods, and the influence of surfaces and interfaces on material properties. Emphasis is placed on understanding how surface and interface behavior affects mechanical, thermal, optical, and electronic properties, with applications in coatings, microelectronics, nanomaterials, and advanced materials engineering.		
PREREQUISITES	This course builds on foundational knowledge of materials science, solid-state physics, and chemistry. Students are expected to have an understanding of crystal structures, bonding, thermodynamics, and basic materials characterization techniques. Familiarity with thin-film deposition methods and surface analysis tools is helpful but not required, as the course introduces these concepts in the context of surface and interface phenomena.		
TEACHING AND EXAMINATION METHODS	Lectures, Homework assignments, Quizzes, Midterm examination, Final exam		
COURSE OFFERED TO ERASMUS STUDENTS	Yes.		
COURSE URL	https://elearning.auth.gr/course/view.php?id=xxxxx		

2. LEARNING OUTCOMES	
Learning Outcomes	Students will understand the principles of surfaces, interfaces, and thin films, analyze thin-film growth and deposition techniques, and apply this knowledge to predict material behavior. They will also evaluate surface and thin-film properties using characterization methods and relate these phenomena to engineering applications in coatings, microelectronics, and advanced materials.
General Skills	Students will develop analytical and problem-solving skills, interpret surface and thin-film behavior, and apply theoretical and experimental methods to materials engineering challenges. They will

	also gain technical proficiency and the ability to communicate scientific results effectively.

3. COURSE CONTENT

The course covers fundamental concepts of surfaces, interfaces, and thin-film materials, including surface energy, adsorption, wetting, and interfacial phenomena. Students will study thin-film growth mechanisms, deposition techniques, and characterization methods, and explore how surfaces and interfaces influence mechanical, thermal, optical, and electronic properties. Applications in coatings, microelectronics, and nanostructured materials are emphasized throughout.

4. LEARNING & TEACHING METHODS - EVALUATION

Teaching method	Face-to-face.
Use of ICT	ICT plays a significant role in enhancing teaching, learning, experimentation, visualization, and assessment in this course as follows: **Computational Tools for Problem Solving:** Spreadsheet calculations (Excel, Google Sheets), Coding solutions in Python, MATLAB, or Mathematica **Online Learning Platforms:** Learning management systems (LMS) like Moodle, Online lectures, video tutorials, and animations, **Communication and Collaboration:** Online discussion forums, Collaborative documents, Sharing of data and reports **Presentation and Reporting Tools:** Lab reports (word processors), Data plots and charts (graphing tools), Presentations (PowerPoint, Google Slides).
Teaching organization	The supervised and unsupervised workload per activity is indicated below (total workload complies with ECTS standards).

Activity	Workload/semester (hours)
Lectures	52
self-study, quizzes, on-line tests	46
Independent study	50
Final written exam	2
Total	**150**

Student evaluation	Assessment Language: English • Assessment Methods: Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Written Exams

5. SUGGESTED BIBLIOGRAPHY

Course Bibliography

Solid Surfaces, Interfaces and Thin Films Textbook |ISBN 978-3-319-10755-4 | Springer 2015

Additional bibliography for study

Handbook of Surfaces and Interfaces of Materials | ISBN 978-0-12-513910-6 | Academic Press 2001