COURSE SYLLABUS						
Course Title	**Course Code**	**Semester**	**Course Hour/Week**		**Credit**	**ECTS**
Product Design Management	INDD442	2	**Theory** 3	**Practice** 0	3	4
Course Type	**Compulsory Courses**	**Department Elective**	**Faculty Elective**	**University Elective**	**CoHE (YÖK) Compulsory**	**Other**
	x					
Level of Course	Associate Degree (Short Cycle)		Undergraduate (First Cycle)		Graduate / Doctoral (Second / Third Cycle)	
			x			

Language of Instruction	English

Course Instructor(s)		E-mail: Office:
Course Objectives	This course introduces design students to the principles and applications of smart materials in contemporary products design. Students will develop the ability to evaluate, select, and creatively integrate responsive materials into innovative, sustainable products and environments. The course aims to foster interdisciplinary thinking that bridges material science, user experience, and adaptive design strategies.	
Course Learning Outcomes	**Students To Do:**	**Teaching Methods** / **Evaluation Methods**
	Identify and define the fundamental principles, classifications, and behaviors of smart materials used in architecture, interior architecture, and industrial design.	Lectures, Assigned readings. / Midterm Exam, Project submission.

	Explain and interpret how smart materials respond to environmental stimuli and evaluate their relevance to adaptive and sustainable design.	Interactive presentations, Case discussions.	Midterm Exam, Project submission.
	Analyse precedent projects and applications that integrate smart materials across different design disciplines.	Case study analysis, Group discussions.	Midterm Exam, Project Evaluation.
	Apply appropriate smart materials in conceptual design proposals based on performance criteria and user needs.	Design studio exercises, Material workshops.	Midterm Exam, Project Evaluation.
	Develop innovative design concepts that incorporate responsive materials into products, interiors, or architectural elements.	Model-building exercises, analysis tasks, and Personal development exercises.	Final Project Submission.
	Create and present material-driven design solutions using visual, verbal, and digital communication techniques.	Model-building, Presentation, Media production labs.	Final Project Submission.
Course Content	An introduction to the principles, properties, and interdisciplinary applications of smart and responsive materials in products design, with emphasis on material-driven innovation and sustainable design strategies..		

COURSE OUTLINE/SCHEDULE			
Week	**Topic**	**Implementation (theory/practice)**	**Required Reading, Preliminary preparation**

1	Introduction to the course. Overview of smart materials and their role in contemporary design.	T	No preliminary preparation needed.
2	Electrochromic Glass: Principles, applications in architecture, interiors, and products.	T	Short reading on smart glazing systems.
3	Phase Change Materials (PCM): Thermal regulation and sustainable design applications.	T	Case study review on passive cooling.
4	Shape Memory Alloys (Nitinol): Motion without motors and kinetic design potentials.	T	Material behavior research.
5	Thermochromic Materials: Heat-responsive surfaces and user feedback systems.	T	Visual research on color-changing materials.
6	Photochromic Materials: Sunlight-responsive materials and daylight integration.	T	Precedent analysis.
7	Conductive Polymers: Flexible electronics and smart surfaces.	T	Basic reading on flexible electronics.
8	Review of the previously studied materials and the Midterm exam.	T	
9	Self-Healing Materials: Durability, maintenance reduction, and lifecycle thinking.	T	Research examples of self-healing systems.
10	Piezoelectric Materials: Energy harvesting and interactive environments.	T	Case study preparation.
11	ETFE Smart Membranes: Lightweight envelope systems and pneumatic structures.	T	Precedent study on ETFE structures.
12	Liquid Crystal / PDLC Films: Switchable transparency and privacy systems.	T	Market examples review.
13	Fiber Optic Textiles: Light-integrated flexible materials and experiential design.	T	Visual precedent collection.

14	Hygromorphic Materials: Humidity-responsive biomimetic systems.	T	Biomimicry case researc.h
15	Photoluminescent Materials: Glow-in-the-dark systems and low-energy lighting. Final project development workshop.	T	Working on the final project.
16	Critiques on the FINAL PROJECT.	T	Working on the final project.
17	**FINAL EXAM**		

Required Course Material(s) / Reading(s)/ Text Book(s)	• Chapman, J. (2015). *Emotionally durable design: Objects, experiences and empathy (2nd ed.)*. Routledge. Call number: TS170.5 .C36 2015 • Fiell, C., & Fiell, P. (2000). *Industrial design A–Z.* Taschen. Call number: TS171 .F54 2000 • Zec, P. (2018). *The form of success: Design as a corporate strategy*. Red Dot Edition. Call number: TS171 .Z43 2018
Recommended Course Material(s)/ Reading(s) /Other	• Koch, C. H. W. (2022). *The future of industrial design and its role in Industry 4.0* [Doctoral dissertation, Swinburne University of Technology]. DOI: 10.13140/RG.2.2.15506.32969

ASSESSMENT		
Learning Activities	**NUMBER**	**WEIGHT in %**
Mid-Term	1	40
Quiz		
Assignment		
Portfolio		

Project		
Field Study		
Presentation / Seminar		
Studio Practice		
Other		
Contribution of Final Examination/Final Project/ Dissertation to the Final Grade	1	60
TOTAL	2	100

CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME LEARNING OUTCOMES

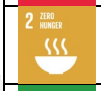
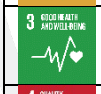
No	**PROGRAMME LEARNING OUTCOMES**	Level of Contribution (1-lowest/ 5- highest)				
		1	2	3	4	5
P1	Understand knowledge of industrial design principles, design methodologies, history, aesthetics, form & function, and product development processes.					x
P2	Explain the properties of materials, manufacturing technologies, and production methods used in industrial product design.					x
P3	Understand ergonomics and user-centered design concepts in product development.				x	
P4	Understand sustainability principles, environmental impacts, and life-cycle considerations in industrial design.					x
P5	Analyze design problems, user needs, and market requirements to develop appropriate product design solutions.					x
P6	Generate creative product concepts using sketching, ideation techniques, and visual exploration methods.					x
P7	Develop product designs using digital tools, 3D modeling, and rendering software.					x

P8	Develop prototypes or models to evaluate product functionality, usability, and aesthetics.				x	
P9	Communicate design ideas effectively through sketches, technical drawings, models, and professional presentations.					X
P10	Work effectively in multidisciplinary teams during product design and development processes.					x
P11	Manage design projects considering production constraints, market needs, and economic feasibility.					x
P12	Demonstrate professional responsibility, ethical awareness, and commitment to sustainable design practices.					x

ECTS / STUDENT WORKLOAD				
ACTIVITIES	**NUMBER**	**UNIT**	**HOUR**	**TOTAL (WORKLOAD)**
Course Teaching Hour (X weeks * total course hours)	16	1	2	32
Preliminary Preparation and self- study	3	1	10	30
Mid-Term	1	1	20	20
Quiz				
Assignment				
Portfolio				
Project				
Field Study				
Presentation / Seminar				
Studio Practice				
Final Examination/ Final Project/ Dissertation	1	1	20	20
TOTAL WORKLOAD				102

TOTAL WORKLOAD / 25				4,08
ECTS				4

ETHICAL RULES WITH REGARD TO THE COURSE
Plagiarism Disclaimer Detected and undetected plagiarism is a serious offense at any time, and it could have devastating effects on your degree result and future professional life. Plagiarism is easy to avoid if you make sure to identify and acknowledge your sources thoroughly and do not copy directly from visual examples, designs, or notes that have in turn been taken word-for-word from your sources.

	SDG 1: No Poverty	
	SDG 2: Zero Hunger	x
	SDG 3: Good Health and Well-Being	
	SDG 4: Quality Education	x
	SDG 5: Gender Equality	
	SDG 6: Clean Water and Sanitation	
	SDG 7: Affordable and Clean Energy	x
	SDG 8: Decent Work and Economic Growth	
	SDG 9: Industry, Innovation and Infrastructure	x
	SDG 10: Reduced Inequalities	
	SDG 11: Sustainable Cities and Communities	x
	SDG 12: Responsible Consumption and Production	x

	SDG 13: Climate Action	
	SDG 14: Life Below Water	
	SDG 15: Life on Land	
	SDG 16: Peace, Justice and Strong Institutions	x
	SDG 17: Partnership for the Goals	

ASSESSMENT DETAILS AND EVALUATION CRITERIA:	
Final grades will be determined based on the course learning activities and the assessment details for the final examination or project, as outlined below, in accordance with the University's Education and Examination Regulations. Students are required to attend at least 70% of the classes. The maximum allowable absenteeism is 30%. Midterm: 40% Final: 60%	
PREPARED BY	
UPDATED	
APPROVED	