Syllabus

Kursbeschreibung

Titel der Lehrveranstaltung	Design with Composite Materials
Code der Lehrveranstaltung	47564
Zusätzlicher Titel der Lehrveranstaltung	
Wissenschaftlich-disziplinärer Bereich	IIND-03/C
Sprache	Englisch
Studiengang	Master in Industrie- und Maschineningenieurwesen
Andere Studiengänge (gem. Lehrveranstaltung)	
Dozenten/Dozentinnen	Dr. Ing. Karl Peter Leibenguth, KarlPeter.Leibenguth@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/47569
Wissensch. Mitarbeiter/Mitarbeiterin	
Semester	Erstes Semester
Studienjahr/e	2
KP	5
Vorlesungsstunden	28
Laboratoriumsstunden	18
Stunden für individuelles Studium	79
Vorgesehene Sprechzeiten	15
Inhaltsangabe	Achieving an understanding of composite materials as an important technical means beyond structural applications; to be able to select material combinations based on the external load acting on the object; to get acquainted with different approaches to composite material design with an additional perspective on nature and biological inspired approaches; to gain knowledge on how to characterize composite materials and to assess their failure in

	operation to derive design optimizations.
Themen der Lehrveranstaltung	1• General introduction to composites and their history • Materials and Technical applications • Production and processing technologies • Behaviour of composites: lab v. operational conditions • Design and construction • Destructive and non-destructive characterization and failure assessments • Recycling and sustainability considerations
Stichwörter	Composite Materials Structural Design Processing Technologies Mechanical Performance Failure Assessment
Empfohlene Voraussetzungen	Basic material science, construction and production technologies, experimental physics.
Propädeutische Lehrveranstaltungen	
Unterrichtsform	Lecture and exercise.
Anwesenheitspflicht	Not mandatory but strongly recommended.
Spezifische Bildungsziele und erwartete Lernergebnisse	Learning outcomes (ILO): 1. Knowledge and understanding: Students should know the theoretical background of diverse composite materials from materials, processing, calculation, and design perspective 2. Applying Knowledge and understanding: Students should be able to discern the different properties and production methods of the basic material classes from those of composite materials. They should be able to select and use basic calculation methods to determine composite behaviour from data of the constituent materials. 3. Making judgments: Students should be able to critically decide when to employ composite materials in component/product design, how to experimentally assess their properties and how to use failure cases analyses as a means to improve designs.

	4. Communication skills: Students should be able to present results of the exercises and contributions to discussions/own talks in appropriate technical/scientific language. 5. Learning skills Students should be able to autonomously search and critically appraise technically relevant data, publications and case studies.
Spezifisches Bildungsziel und erwartete Lernergebnisse (zusätzliche Informationen)	
Art der Prüfung	- Formative assessment: In-classe exercises: 9x120 minutes; ILOs assessed: 1, 2, 3, 4, 5. - Summative assessment: 100% written exam: 2 hours; ILOs assessed: 1, 2, 3, 4.
Bewertungskriterien	Performance in written exam.
Pflichtliteratur	T.W. Clyne et al., "An Introduction to Composite Materials", Cambridge University Press, 3rd ed., 2019, ISBN 978-0-521-86095-6 K.K. Chawla, "*Composite Materials – Science and Engineering*", Springer, 4th ed., 2019, ISBN 978-3-030-28982-9 M.F. Ashby, "*Materials Selection in Mechanical Design*", Butterworth-Heinemann, 5th ed., 2017, ISBN 978-0-08-100599-6
Weiterführende Literatur	J. Rösler et al., "*Mechanisches Verhalten der Werkstoffe*", Vieweg+Teubner, 3rd ed., 2008, 978-3-8351-0240-8 M.F. Ashby, "*Materials and the Environment – Eco-informed Material Choice*", Butterworth-Heinemann, 3rd ed., 2021, ISBN 978-0-12-821521-0 C. Mattheck, "Design in Nature – Learning from Trees", Springer,

	1st ed., 1998, ISBN 978-3-642-58747-4
Weitere Informationen	
Ziele für nachhaltige Entwicklung (SDGs)	Hochwertige Bildung, Maßnahmen zum Klimaschutz, Nachhaltiger Konsum und Produktion, Industrie, Innovation und Infrastruktur