Syllabus

Kursbeschreibung

Titel der Lehrveranstaltung	Elements of experimental research and advanced applications of fluid mechanics
Code der Lehrveranstaltung	46049
Zusätzlicher Titel der Lehrveranstaltung	
Wissenschaftlich-disziplinärer Bereich	CEAR-01/B
Sprache	Englisch
Studiengang	Doktoratsstudium in Sustainable Energy and Technologies (Nachhaltige Energie und Technologien)
Andere Studiengänge (gem. Lehrveranstaltung)	
Dozenten/Dozentinnen	Prof. Maurizio Righetti, Maurizio.Righetti@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/33740 Prof. Michele Larcher, Michele.Larcher@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/33885 dr. Giuseppe Roberto Pisaturo, GiuseppeRoberto.Pisaturo@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/38803
Wissensch. Mitarbeiter/Mitarbeiterin	
Semester	Zweites Semester
Studienjahr/e	1
KP	3
Vorlesungsstunden	18
Laboratoriumsstunden	12

Stunden für individuelles Studium	75
Vorgesehene Sprechzeiten	
Inhaltsangabe	The students will have the opportunity to improve their knowledge on some specific topics that are generally not treated in depth in basic courses of fluid mechanics, such as turbulence and non-Newtonian fluids, with a special focus on energy engineering applications. A significant part of the course will be devoted to the explanation and utilization of advanced measuring methods used for fluid mechanics applications in laboratory. In this way the candidates will acquire the competences necessary in order to design and carry out experimental measures on fluids within their research activity.
Themen der Lehrveranstaltung	The course will cover the following topics: • Turbulence insights • General features of granular flows • Advanced measuring techniques in fluid mechanics: - Experimental methods, e.g. Particle Image Velocimetry (PIV), Particle Tracking Velocimetry (PTV), Laser Doppler Anemometry (LDA) - Experimental instruments - Experimental applications
Stichwörter	Fluid mechanics, experimental measurements
Empfohlene Voraussetzungen	Fundamentals of fluid mechanics
Propädeutische Lehrveranstaltungen	
Unterrichtsform	Lectures and tutorials in class; experiments in the laboratory.
Anwesenheitspflicht	Not compulsory
Spezifische Bildungsziele und erwartete Lernergebnisse	By the end of the course, students are supposed to be able to: - Knowledge and understanding: explain the main principles relevant to the topics addressed in the course; develop an intuitive comprehension. - Applying knowledge and understanding: give examples of real applications and practical problems to underline how the topics treated in the course are used within scientific and engineering

	activity. - Making judgements: show the ability to make autonomous judgements in the choice and comparison of the suitable methods and tools for the solution of scientific and engineering problems involving the mechanics of fluids. - Communication skills: communication skills to correctly and properly present the concepts acquired in the course and the analysis of experimental results. - Learning skills: Ability to autonomously extend the knowledge acquired during the study course by reading and understanding scientific and technical documentation.
Spezifisches Bildungsziel und erwartete Lernergebnisse (zusätzliche Informationen)	
Art der Prüfung	The assessment is based on a discussion on the topics covered within the course and on the presentation of the analysis of the results of the experimental activity.
Bewertungskriterien	Students will be evaluated on the base of the oral discussion. Evaluation is based on a 30 points scale. At the examination, knowledge and understanding of the topic (25%), the attitude at applying knowledge and understanding (20%) and at making judgments (20%), the communication skills (20%) and the learning skills (15%) will be assessed.
Pflichtliteratur	The topics will be sampled out of different books and scientific publications. Attending regularly the classes is highly recommended. Some material will be made available in the reserve collection.
Weiterführende Literatur	C. Bailly & G. Comte-Bellot, Turbulence, Springer, 2015 H. Tennekes & J.L. Lumley, A First Course in Turbulence. MIT Press, Cambridge 1972 J.O. Hinze, Turbulence, McGraw-Hill International Book Company, New York, 1975 Y.A. Çengel, & J.M. Cimbala, Fluid Mechanics – Fundamentals and Applications, 2006, McGraw-Hill

	Zhang, Zhengji. LDA Application Methods: Laser Doppler Anemometry for Fluid Dynamics. Berlin: Springer, 2010 Albrecht, H. -E., Damaschke, N., Borys, M., and Tropea, Cameron. Laser Doppler and Phase Doppler Measurement Techniques. Guildford : Berlin, 2010. R. Adrian, J. Westerweel, Particle image velocimetry, Cambridge University Press 2011; M. Raffel et al., Particle image velocimetry: a practical guide, Second edition, Springer 2007
Weitere Informationen	
Ziele für nachhaltige Entwicklung (SDGs)	Hochwertige Bildung, Maßnahmen zum Klimaschutz, Nachhaltiger Konsum und Produktion, Bezahlbare und saubere Energie