

# Syllabus

## *Kursbeschreibung*

<b>Titel der Lehrveranstaltung</b>	Biofeedback and human measurement for engineering research
<b>Code der Lehrveranstaltung</b>	46089
<b>Zusätzlicher Titel der Lehrveranstaltung</b>	
<b>Wissenschaftlich-disziplinärer Bereich</b>	IINF-04/A
<b>Sprache</b>	Englisch
<b>Studiengang</b>	Doktoratsstudium in Advanced-Systems Engineering
<b>Andere Studiengänge (gem. Lehrveranstaltung)</b>	
<b>Dozenten/Dozentinnen</b>	<p>Prof. Yuri Borgianni,  <a href="mailto:Yuri.Borgianni@unibz.it">Yuri.Borgianni@unibz.it</a>  <a href="https://www.unibz.it/en/faculties/engineering/academic-staff/person/35189">https://www.unibz.it/en/faculties/engineering/academic-staff/person/35189</a></p> <p>Prof. Dr. Angelika Peer,  <a href="mailto:Angelika.Peer@unibz.it">Angelika.Peer@unibz.it</a>  <a href="https://www.unibz.it/en/faculties/engineering/academic-staff/person/38684">https://www.unibz.it/en/faculties/engineering/academic-staff/person/38684</a></p> <p>dr. Aurora Berni,  <a href="mailto:Aurora.Berni@unibz.it">Aurora.Berni@unibz.it</a>  <a href="https://www.unibz.it/en/faculties/engineering/academic-staff/person/42284">https://www.unibz.it/en/faculties/engineering/academic-staff/person/42284</a></p> <p>Dott. Isabel Francisca Sota Machado Barradas,  <a href="mailto:Isabel.Barradas@natec.unibz.it">Isabel.Barradas@natec.unibz.it</a>  <a href="https://www.unibz.it/en/faculties/engineering/academic-staff/person/42598">https://www.unibz.it/en/faculties/engineering/academic-staff/person/42598</a></p>
<b>Wissensch. Mitarbeiter/Mitarbeiterin</b>	
<b>Semester</b>	Erstes Semester
<b>Studienjahr/e</b>	2025/2026
<b>KP</b>	4
<b>Vorlesungsstunden</b>	40

<b>Laboratoriumsstunden</b>	
<b>Stunden für individuelles Studium</b>	60
<b>Vorgesehene Sprechzeiten</b>	
<b>Inhaltsangabe</b>	<p>The course focuses on measurable parameters of the human body, commonly referred as biofeedback, neurophysiologic or biometric measures. These measures are increasingly used in many fields of research, and engineering is of no exception. Biofeedback is particularly popular in those areas characterized by a relevant role of human actions and decisions. Examples include domains where people are asked to interact with artificial elements, such as ergonomics, human-robot, human-computer, and human-product interaction. The main reason for these measures to make inroads in engineering is the enabled possibility to acquire objective data of people's behaviour. While instruments to capture biofeedback originate from the medical field, these are conveniently used to monitor visual behaviour, cognition and effort. Some of the extracted measures are associated with emotional arousal and stress. The course illustrates the main biometric measures involved in engineering research, such as eye- and body-tracking, galvanic skin response, electroencephalography, and electromyography. The course will provide insights into how to design experiments with biometric devices, along with related privacy and ethics considerations. Illustrative applications are provided to support explanations from engineering design, human-robot and human-product interaction, which are most developed research areas at unibz benefitting from biometric tools. Classes benefit from the newly established User Experience Lab and additional equipment owned by unibz, which ensures hands-on learning beyond more theoretical lectures.</p>
<b>Themen der Lehrveranstaltung</b>	<p>Brain imaging techniques  Peripheral physiological signals  Multimodal signal integration  Body tracking  Electromyography  Eye-tracking  Affective computing  Brain- and body- computer interfaces  Design of experiments</p>

	Data interpretation Ethics considerations and data privacy in the use of neurophysiologic or biometric devices
<b>Stichwörter</b>	Biofeedback, biometric tools, physiological signals, human experiments, human behaviour, human-robot interaction, human-product interaction, design of experiments
<b>Empfohlene Voraussetzungen</b>	
<b>Propädeutische Lehrveranstaltungen</b>	
<b>Unterrichtsform</b>	The course is structured into lectures and practical experimental activities. The former are aimed to introduce topics and the fundamentals of various neurophysiologic or biometric tools. The latter are mostly conducted in laboratory or in a laboratory setting.
<b>Anwesenheitspflicht</b>	
<b>Spezifische Bildungsziele und erwartete Lernergebnisse</b>	
<b>Spezifisches Bildungsziel und erwartete Lernergebnisse (zusätzliche Informationen)</b>	Attendants can learn how to incorporate physiological information into their experimental activities, and choose which devices are most suitable to acquire relevant data.
<b>Art der Prüfung</b>	Attending students are asked to submit a report where they describe the use of neurophysiologic or biometric measures in a case study or a hypothetical research activity and justify the choice of these measures based on the objectives.
<b>Bewertungskriterien</b>	Clarity and correctness of the report. Active participation during the course.
<b>Pfichtliteratur</b>	-
<b>Weiterführende Literatur</b>	-
<b>Weitere Informationen</b>	-
<b>Ziele für nachhaltige Entwicklung (SDGs)</b>	Hochwertige Bildung