

Module	<i>Biological Sensing</i>
Code	
Instruction language	German or English
ECTS credits	4
Attendance time	3 hours per week
Duration	1 semester
Cycle	Each winter semester
Coordinator	Dean of Physics Studies
Lecturer	Prof. Dr. Heinrich Hoerber
Allocation to study programmes	Physics M.Sc., elective module
Recommended prerequisites	None.
Learning objectives	<p>Students who successfully passed this module</p> <ul style="list-style-type: none"> • will have a basic understanding of Cell Biology and on non-equilibrium Thermodynamics with focus on reaction kinetics • will have a structural and functional understanding of biological sensor systems and be able to compare them to up-to-date artificial systems developed in autonomous robotics.
Syllabus	<ol style="list-style-type: none"> 1. Introduction to Cell Biology with focus on cellular structures and functions 2. Introduction to non-equilibrium Thermodynamics with focus on reaction kinetics 3. Introduction to Metrology and Information Theory 4. Senses of taste and smell 5. Senses of touching and hearing 6. Sense of seeing
Literature	<ul style="list-style-type: none"> • Essential Cell Biology, 3rd edition, Alberts et al., Garland Science, New York / London 2009 • Physical Biology of the Cell, 2nd edition, Philips et al., Garland Science, New York / London 2013 • The making of measure and the promise of sameness, E. Lugli, University of Chicago Press, Chicago / London 2019 • Information Theory, Inference and Learning Algorithms, D.J.C. McKay, Cambridge University Press, Cambridge UK 2004
Teaching and learning methods	Lecture (3 hours per week)
Workload	<p>18 hours lecture (attendance time)</p> <p>6 hours exercise (attendance time)</p> <p>8 hours self-study and exam preparation</p> <p>Total: 32 hours</p>

Assessment	The module assessment consists of a presentation on a specific topic not covered in the lectures.
Examination	Quality of presentation
Grading procedure	The module grade is equal to the examination grade.
Basis for	
