

2-5 Physics and Applied Numerics

Section:	Foundation course	Credits:	5
Offered:	every semester	Semester:	2
Prerequisites:	Mathematics I, Electrical Engineering, Thermodynamics	Responsible for the module:	Gerber

Structure

Submodule	LP	SWS	Type	PVL	PL	KS	ES	Lecturer
Physics and Applied Numerics	5	4	L + E		Stb	60 h	90 h	Gerber, Entress, Hofmann

Learning objectives

To understand and practice physical concepts and methods for solving engineering science issues. To understand and apply numerical methods to solve engineering science issues.

Contents

In the subsection physics, selected topics from the fields of mechanics, thermodynamics, electromagnetism and vibrations and waves are covered. In applied numerics, these issues are addressed, and techniques for analysing data, for the solution of linear and nonlinear systems of equations, for the solution of differential equations and for visualizing data are taught. Practical application of data acquisition, control and analysis methods with the help of single board computers or microcontrollers such as Raspberry Pi or Arduino.

Special methodology

Practical exercises and individual supervision during student research.

Literature

Hering, Martin, Stöher: Physik für Ingenieure, Springer 2012

Harten, Ulrich: Physik: Eine Einführung für Ingenieure und Naturwissenschaftler, Springer

Halliday, Resnick, Walker: Physik - Bachelor edition, Wiley VCH, Weinheim

Kuchling: Taschenbuch der Physik, Fachbuchverlag Leipzig, Weinheim

Hanke-Bourgeois, Grundlagen der numerischen Mathematik und des wissenschaftlichen Rechnens, Teubner, 2009

Langtangen, A primer on scientific programming with Python, Springer, 2012

Langtangen, Python scripting for computational science