Module Description 39-Inf-AOpt Applied Optimisation

Faculty of Technology

Version dated Jun 1, 2026

This module guide reflects the current state and is subject to change. Up-to-date information and the latest version of this document can be found online via the page

https://ekvv.uni-bielefeld.de/sinfo/publ/modul/108247085

The current and valid provisions in the module guide are binding and further specify the subject-related regulations (German "FsB") published in the Official Announcements of Bielefeld University.

Non-official translation of the module descriptions. Only the German version is legally binding.

39-Inf-AOpt Applied Optimisation

Faculty

Faculty of Technology

Person responsible for module

Dr. Basil Ell

Regular cycle (beginning)

Every winter semester

Credit points

5 Credit points

Competencies

Non-official translation of the module descriptions. Only the German version is legally binding.

Students learn in the lectures and the exercise courses to be able to phrase a given problem as optimization problem and to identify its properties. Depending on the latter, students are able to select a suitable problem solver and they know the properties of found solutions. Students are able to use popular toolboxes. The module includes an exam at the end of the term.

Content of teaching

The goal is to cover important models to phrase optimization problems and important algorithmic approaches to solve those, including constraint versus unconstraint optimization, linear and convex optimization, duality, nonlinear optimization, discrete optimization and relaxation. A few important methods are covered including conjugate gradient, quasi Newton methods such as LBFGS, interior point methods, Lagrange multipliers and barrier functions and exemplary global methods such CMA-ES.

Recommended previous knowledge

–

Necessary requirements

–

Explanation regarding the elements of the module

Module structure: 1 bPr [1]

Courses

Title	Type	Regular cycle	Workload [5]	LP[2]
Applied Optimisation	exercise	WiSe	60 h (30 + 30)	2
Applied Optimisation	lecture	WiSe	60 h (30 + 30)	2 [Pr]

Examinations

Allocated examiner	Type	Weighting	Workload	LP[2]
Teaching staff of the course **Applied Optimisation (lecture)** *Portfolio consisting of per default weekly exercises or programming tasks and final written exam (per default 60 minutes) or final oral exam (per default 15 minutes). The exercises are based on the content of the lecture and enable students to train and further investigate the topics. It is required that a sufficient percentage of the exercises are successfully completed (per default 50% of the total number of points which can be achieved during a semester). The final oral exam concerns both, the content of the lecture as well as the exercises.*	Portfolio mit Abschlussprüfung	1	30h	1

Legend

1 The module structure displays the required number of study requirements and examinations.

2 LP is the short form for credit points.

3 The figures in this column are the specialist semesters in which it is recommended to start the module. Depending on the individual study schedule, entirely different courses of study are possible and advisable.

4 Explanations on mandatory option: "Obligation" means: This module is mandatory for the course of the studies; "Optional obligation" means: This module belongs to a number of modules available for selection under certain circumstances. This is more precisely regulated by the "Subject-related regulations" (see navigation).

5 Workload (contact time + self-study)

SoSe Summer semester

WiSe Winter semester

SL study requirement

Pr Examination

bPr Number of examinations with grades

uPr Number of examinations without grades