

Course Manual MLWR

Machine Learning and Scientific Computing

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– General information

Long name Machine Learning and Scientific Computing

Approving CModule [MLWR MaCSN](#),
[MLWR MaET](#),
[MLWR MaTIN](#)

Responsible Prof. Dr. Beate Rhein
Professor Fakultät IME

Valid from summer semester 2021

Level Master

Semester in the year summer semester

Duration Semester

Hours in self-study 60

ECTS 5

Professors Prof. Dr. Beate Rhein
Professor Fakultät IME

Requirements Basic knowledge of probability theory and machine learning

Language German

Separate final exam Yes

Literature

Final exam

Details

Questions of different degrees of difficulty and different aspects of the course (course of a project, performance measures, data protection, etc.) some in-depth questions
It is possible to write down sketches and formulas.

Minimum standard

be able to describe the rough sequence of a machine learning or scientific computing project Being able to explain discussed procedures roughly

Exam Type

EN mündliche Prüfung, strukturierte Befragung

– Lecture / Exercises

Learning goals

Goal type	Description
Knowledge	<p>Approximation methods metamodeling regression</p> <p>Multi-criteria optimization formulation Pareto front algorithms visualization</p> <p>Advanced Cluster Analysis</p> <p>Association Pattern Mining</p> <p>Outlier Detection</p> <p>Advanced classification procedures possibly text recognition, web mining, time series analysis</p>
Skills	<p>Be familiar with mathematical methods, which are suitable for application tasks, convert them into run-time and memory optimized programs using numerical methods and skilful implementation</p> <p>Know approximation methods and select and apply the appropriate method for a task</p> <p>Formulate an application task as a multi-criteria optimization task and solve it in a program</p> <p>Know methods of machine learning, select and apply appropriate procedures</p>

Special literature

Data Mining - The Textbook, C.C. Aggarwal,
Springer Verlag, ISBN 978-3-319-14141-1

Strukturoptimierung, L. Harzheim, Harri Deutsch
Verlag, ISBN 978-3-8085-5659-7

Special requirements

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Accompanying material

Lecture slides
(electronic)
possibly tutorials,
instructional videos or
links to them
Practical task, partly
with data sets and
literature

Separate exam

No

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Lecture	2
Exercises (whole course)	2
Exercises (shared course)	0
Tutorial (voluntary)	0



– Practical training

Learning goals

Goal type	Description
Skills	Apply and program methods of approximation, multicriteria optimization or machine learning efficiently implement numerical methods Evaluate the complexity of algorithms

Special requirements

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Accompanying material	Electronic task description sample programs Electronic tutorials for self-study
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Separate exam	No
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Expenditure classroom teaching

Type	Attendance (h/Wk.)
Practical training	1
Tutorial (voluntary)	0