Module name	**Digitisation and Data Analytics**
Module number	CMS-TRK-DDA
Senior Lecturer	Prof. Dr. Wolfgang Nagel wolfgang.nagel@tu-dresden.de
Qualification objectives	Students understand different concepts of data storage and metadata collection and can develop data management concepts for existing datasets. Students are familiar with and understand different methods of data pre-processing, exploratory data analytics and machine learning, can assess their strengths and weaknesses in relation to given data, and can use up-to-date software frameworks to apply the methods both locally and on a HPC infrastructure.
Contents	The content of the module is current approaches to big data analysis for specific computing architectures, as well as high performance computing (HPC) processing, different data analytics approaches and their use in the HPC environment. Other content includes data analytics frameworks, basics of statistical analysis and machine learning methods, as well as selected applications.
Forms of teaching and learning	The module includes lectures of 2 SWS, exercises of 2 SWS and self-study. The language of the lectures and exercises will be English.
Eligibility for participation	Basic knowledge of statistics and linear algebra at bachelor's level is required, as well as basic knowledge of the use of Python. The following literature is suitable for preparation: 1. Mathematics for Engineers II: Calculus and Linear Algebra. G. Baumann. Oldenbourg Verlag, 2010. http://dx.doi.org/10.1524/9783486598476, 2. All of Statistics. L. Wasserman. Springer. 2004 https://link.springer.com/book/10.1007/978-0-387-21736-9, 3. Python for Data Analysis 3 rd Ed. W. McKinney. O'Reilly Media, 2022. https://learning.oreilly.com/library/view/-/9781098104023/?ar.

Usability	In the Computational Modeling and Simulation Masters Course, the module is a compulsory voting module in Track Visual Computing, Track Computational Engineering, Track Computational Life Science and Track Applied Artificial Intelligence, to be selected in accordance with Annex 2 to the Specific Examination Regulations. The module cannot be chosen in the Master's Course Computational Modeling and Simulation if this or a module with substantially the same content from a Course with which the entry conditions under § 3 of the Studienordnung have been met has already been completed. The module provides the pre-requisites for the modules it designates under the pre-requisites for participation.
Conditions for the award of credits	Credits are awarded when the module test is passed. The module test consists of a 90-minute away day. The language of the test will be English.
Credits and marks	The module allows 5 credit points to be obtained. The module score corresponds to the test performance score.
Frequency of the module	The module is offered every summer semester.
Workload	The total workload is 150 hours.
Duration of the module	The module covers 1 semester.