Modulbezeichnung (Kürzel)	**Analytics & Mathematics** (ANMA)
Modulbezeichnung (eng.)	Analytics & Mathematics
Semester (Häufigkeit)	WPM (jedes Wintersemester)
ECTS-Punkte (Dauer)	5 (1 Semester)
Art	Wahlpflichtmodul Zertifikat Industrial Cyber-Physical Systems
Sprache(n)	Englisch
Studentische Arbeitsbelastung	60 h Kontaktzeit + 90 h Selbststudium
Voraussetzungen (laut MPO)	
Empf. Voraussetzungen	Mathematical knowledge at Bachelor level
Verwendbarkeit	MII
Prüfungsform und -dauer	Mündliche Prüfung oder Studienarbeit
Lehr- und Lernmethoden	Vorlesung
Modulverantwortliche(r)	E. Wings

Qualifikationsziele
Students have to be able to estimate and evaluate the numerical challenge of a large amount of data. With the support of a standard-software, students have to be able to analyse, assess and use selected algorithms for high-dimensional problems. On this basis, students will be able to assess the applicability of (commercial) software-packages in a scientific context. After learning the major characteristics of Analytics as component of an Industry 4.0- and/or IIRA-compliant digitalized eco-system, the students will have the possibility to investigate and applied in a prototype manner, different kind of Analytics for different application sectors.

Lehrinhalte
The importance of data analysis, especially of a large amount of data (Big Data), is growing in the areas of science and economy. The lecture approaches concepts, algorithms and technology for the analysis of a large amount of data. Numerical methods for solving high-dimensional linear and non-linear systems of equations, as well as the process for calibration and Maximum-Likelihood will be addressed. Analytics created using digitalized data and information provided by Industrial Cyber-Physical Systems are an essential component of digitalized environments, providing support for decision-making functions at different levels in industry, transportation, energy, health eco-systems (or combination of them). The lecture offers the possibility to understand different kind of analytics and how they can be integrated within Industry 4.0 (RAMI 4.0) and Industrial Internet Reference Architecture (IIRA) environments.

Literatur
Wu, James; Stephen Coggeshall, Stephen: Foundations of Predictive Analytics. Chapman and Hall/CRC, 2012
Bühlmann, Peter; Drineas, Petros; Kane, Michael; van der Laan, Mark: Handbook of Big Data. Chapman and Hall/CRC, 2016
The Industrial Internet of Things. Volume T3: Analytics Framework. Industrial Internet Consortium 2017.
AI-Guide Platform 4.0. 2020.
What Is Data and Analytics? https://www.gartner.com/en/topics/data-and-analytics
R Core Team: R: A Language and Environment for Statistical Computing, R Foundation for Statistical Computing, Wien, Österreich http://www.R-project.org/.

Hinweis
MII-students who do not follow a certificate programme have to choose either “Analytics & Mathematics“ or “Mathematik in der Robotik“ as a mandatory module.

Lehrveranstaltungen

Dozenten/-innen	**Titel der Lehrveranstaltung**	**SWS**

E. Wings, A. W. Colombo	Analytics & Mathematics	4