Course Handbook Industrial Engineering Master

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Industrial Engineering Master - mandatory courses (overview)

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator

(0 modules)

Industrial Engineering Master - optional courses (overview)

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator
AI-Assisted Writing	WiMb21IN120	P520-0047	-	0BL	6	Prof. Dr. Stefan Georg
Cost Analyses and Control	WiMb21WW101		-	0PA	6	Prof. Dr. Stefan Georg
Industry 4.0 & Hybrid Value Creation	WiMb21IN112		-	0PA	6	Prof. Dr.-Ing. Christian Köhler
Machine Learning and Identification	WiMb21NT108		-	1SU+3PA	6	Prof. Dr. Frank Kneip
Technology and Innovation Management	WiMb21IN119		-	-	6	Prof. Dr.-Ing. Christian Köhler

(5 modules)

Industrial Engineering Master - mandatory courses

Industrial Engineering Master - optional courses

AI-Assisted Writing

Module name (EN): AI-Assisted Writing
Degree programme: <u>Industrial Engineering, Master, SO 01.10.2026</u>
Module code: WiMb21IN120
Hours per semester week / Teaching method: 0BL
ECTS credits: 6
Semester: according to optional course list
Mandatory course: no
Language of instruction: German
Assessment: Portfolio [*updated 23.09.2025*]
Workload: The total student study time for this course is 180 hours.
Recommended prerequisites (modules): None.
Recommended as prerequisite for:
Module coordinator: Prof. Dr. Stefan Georg
Lecturer: Prof. Dr. Stefan Georg [*updated 26.09.2025*]
Learning outcomes: After successfully completing this module, students will be able to: Use prompting techniques. Conduct AI-based literature searches, Use alternative AI-supported brainstorming tools,

Use alternative AI tools for language improvement,
Identify and fix the weaknesses of AI-supported text creation.

[*updated 23.09.2025*]

Module content:
1. Self-reflection on prior knowledge in the field of artificial intelligence
2. Introduction to artificial intelligence
3. Basic prompting techniques
4. AI-powered tools for generating ideas and brainstorming
5. AI-supported literature research
6. AI-powered text generation tools
7. AI-powered language improvement tools
8. Manual optimization of AI-supported texts
9. Final reflection on the opportunities and limitations of AI-assisted writing

[*updated 23.09.2025*]

Teaching methods/Media:
Moodle-based online course

[*updated 23.09.2025*]

Recommended or required reading:
Brommer, S., et al. (2023). Wissenschaftliches Schreiben im Zeitalter von KI gemeinsam verantworten (Hochschulforum
Digitalisierung beim Stifteverband für die Deutsche Wissenschaft e.V., Hrsg.). Edition Stifterverband.
https://hochschulforumdigitalisierung.de/wp-content/uploads/2023/11/HFD_DP_27_Schreiben_KI.pdf
Buck, Isabelle: Wissenschaftliches Arbeiten mit KI (2025). utb.
de Witt, C., Rampelt, F., & Pinkwart, N. (Hrsg.). (2020). Whitepaper   Künstliche Intelligenz in der Hochschulbildung .
https://doi.org/10.5281/ZENODO.4063722
Hochschule für Technik und Wirtschaft Berlin. (2023b). KI-Verzeichnis & Angabe von KI-Tools als Quellen/Hilfsmittel. Hand
Eigenständigkeitserklärung & KI-Verzeichnis.
https://www.htw-berlin.de/fileadmin/HTW/Zentral/LSC/Formulare/Eigenstaendigkeitserklaerung_KI_HTW_20230823_LSC_(
Kremb, M. (2023). Lesen, schreiben, rechnen, prompten. WirtschaftsWoche Heft 26/2023 vom 23.06.2023, 26, 38.
Salden, P., & Leschke, J. (Hrsg., 2023). Didaktische und rechtliche Perspektiven auf KI-gestütztes Schreiben in der Hochschull
Zentrum für Wissenschaftsdidaktik der Ruhr-Universität Bochum. https://doi.org/10.13154/294-9734
Schindler, K. (2023). ChatGPT oder Überlegungen zu den Veränderungen des Schreibens in der Schule.
https://doi.org/10.18716/OJS/MIDU/2023.2.5
Theisen, M. R. (2023). ChatGPT: Risiken, Gefahren und Chancen in Lehre und Forschung. WiSt   Wirtschaftswissenschaftlich
Studium, 52(12), 17   23. https://doi.org/10.15358/0340-1650-2023-12-17

[*updated 23.09.2025*]

Cost Analyses and Control

Module name (EN): Cost Analyses and Control

Degree programme: Industrial Engineering, Master, SO 01.10.2026

Module code: WiMb21WW101

Hours per semester week / Teaching method: 0PA
ECTS credits: 6
Semester: according to optional course list
Mandatory course: no
Language of instruction: German
Assessment: Tests (question catalogue) as a prerequisite for admission to the final assignment [*updated 08.05.2023*]
Workload: The total student study time for this course is 180 hours.
Recommended prerequisites (modules): None.
Recommended as prerequisite for:
Module coordinator: Prof. Dr. Stefan Georg
Lecturer: Prof. Dr. Stefan Georg [*updated 26.09.2025*]

Learning outcomes:
After successfully completing this module students will:
    be able to determine cost structures and data as they relate to an operational functional area,
    be able to derive typical problems from the field of cost management,
    be able to apply methods for operational cost control and cost analysis,
    be able to apply methods for operational cost control and cost analysis,
 	
[*updated 08.05.2023*]

Module content:
Basics of Cost Management
Operational cost management
    Procurement cost management
    Personnel cost management
    Inventory cost management
    Energy cost management
    Logistics cost management
    Advertising cost management
    Project cost management

Strategic cost management:
>   Fixed cost management
>   Target cost management
>   Process cost management
>   Lifecycle cost management

[*updated 08.05.2023*]

Teaching methods/Media:
>   Expert talks and discussions
>   The following book will be made available for the course: Cut! Rezepte für ein wirkungsvolles Kostenmanagement (Georg, S., Verlag Vahlen, ISBN 978-3-8006-5114-6)

[*updated 08.05.2023*]

Recommended or required reading:
>   Georg, S: Kostensteuerung und Kostenanalyse, Onlinequelle: https://wiin-kostenmanagement.de
>   Joos, T.: Controlling, Kostenrechnung und Kostenmanagement, Springer Gabler, 2014.
>   Kremin-Buch, B.: Strategisches Kostenmanagement, Gabler, 2012.
>   Schwarzmaier, U./Mayr, Chr.: Übungsbuch Controlling, Kiehl, 2018.

[*updated 08.05.2023*]

Industry 4.0 & Hybrid Value Creation

Module name (EN): Industry 4.0 & Hybrid Value Creation

Degree programme: Industrial Engineering, Master, SO 01.10.2026

Module code: WiMb21IN112

Hours per semester week / Teaching method:
0PA

ECTS credits:
6

Semester: according to optional course list

Mandatory course: no

Language of instruction:
German

Assessment:
Written exam or term paper or case study

[*updated 14.06.2021*]

Workload:
The total student study time for this course is 180 hours.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr.-Ing. Christian Köhler

Lecturer: Prof. Dr.-Ing. Christian Köhler

[*updated 26.09.2025*]

Learning outcomes:
After successfully completing this module, students will:
   be familiar with the Industry 4.0 vision and examples of its implementation,
   be able to assess the requirements, opportunities, risks and limitations of implementing Industry 4.0,
   be able to apply strategies and process models for identifying the potential of Industry 4.0 and for
operational implementation, taking into account the factors technology, organization and human resources,
   be familiar with the concept and the economic, as well as ecological benefits of hybrid value creation,
   be able to apply strategies and procedures for the implementation of hybrid value creation processes
and business models.

[*updated 14.06.2021*]

Module content:
   Basics and overall potential of Industry 4.0
   Basic tools for technology management
   Identifying potentials of Industry 4.0 in companies
   Implementing Industry 4.0 in companies
   Basics of hybrid value creation / (industrial) product service systems
   Hybrid value creation as a business model for Industry 4.0
   Hybrid value creation as a business model for circular value creation (Circular economy)
   Designing and implementing hybrid value creation business models

[*updated 14.06.2021*]

Teaching methods/Media:
   Expert talks / Coaching
   Current specialist articles
   Self-study materials and case studies

[*updated 14.06.2021*]

Recommended or required reading:
   Lucks, K.: Praxishandbuch Industrie 4.0 : Branchen - Unternehmen - M & A, Schäffer-Poeschel, 2017
   Vogel-Heuser, B., Bauernhansl, T., ten Hompel, M. (Hrsg.): Handbuch Industrie 4.0, Band 1-4,
SpringerVieweg, 2017
   Jahn, M.: Industrie 4.0 konkret, SpringerGabler, 2017
   Bauernhansl, T., ten Hompel, M., Vogel-Heuser, B. (Hrsg.): Industrie 4.0 in Produktion,
Automatisierung und Logistik, SpringerVieweg, 2014
   Wagner, R.: Industrie 4.0 für die Praxis, SpringerGabler, 2018
   Köhler, C.: Produktionsoptimierung mit Wertstromworkshops   Leitfaden zur zielorientieren

Optimierung und Gestaltung von Produktionsflüssen, ePubli, 2017

      Aurich, J.C., Clement, M.H.: Produkt-Service Systeme: Gestaltung und Realisierung, Springer, 2010

      Aurich, J.C., Koch, W., Kölsch, P., Herder, C. (Hrsg.): Entwicklung datenbasierter Produkt-Service Systeme: Ein Ansatz zur Realisierung verfügbarkeitsorientierter Geschäftsmodelle, SpringerVieweg, 2019

      Meier, H., Uhlmann, E. (Hrsg.): Industrielle Produkt-Service Systeme   Entwicklung, Betrieb und Management, SpringerVieweg, 2017

[*updated 14.06.2021*]

Machine Learning and Identification

Module name (EN): Machine Learning and Identification
Degree programme: <u>Industrial Engineering, Master, SO 01.10.2026</u>
Module code: WiMb21NT108
Hours per semester week / Teaching method: 1SU+3PA (4 hours per week)
ECTS credits: 6
Semester: according to optional course list
Mandatory course: no
Language of instruction: German
Assessment: Project work   [*updated 21.06.2021*]
Workload: 60 class hours (= 45 clock hours) over a 15-week period.   The total student study time is 180 hours (equivalent to 6 ECTS credits).   There are therefore 135 hours available for class preparation and follow-up work and exam preparation.
Recommended prerequisites (modules):   None.
Recommended as prerequisite for:
Module coordinator: Prof. Dr. Frank Kneip
Lecturer: Prof. Dr. Frank Kneip   [*updated 26.09.2025*]

Learning outcomes:
        After successfully completing this moduel, students will be familiar with machine learning and identification.
        They will have in-depth knowledge about parameter and state estimation procedures.
        They will be able to determine states of a system (e.g. a technical machine or an economic system) and/or its parameterization uisng the available data sets.

[*updated 21.06.2021*]

Module content:
        Linear regression
        Iterative methods
        Parameter identification method
        State estimates of a dynamic system

[*updated 21.06.2021*]

Teaching methods/Media:
        Lecture introduction to machine learning and identification (esp. state and parameter estimation)
        Independent project work/case studies under supervision
        Discussions between students and lecturers
        The results of the students' project work must be documented in a suitable form (written paper and presentation).

[*updated 21.06.2021*]

Recommended or required reading:
        Will be announced at the beginning of the module.

[*updated 21.06.2021*]

Technology and Innovation Management

Module name (EN): Technology and Innovation Management

Degree programme: Industrial Engineering, Master, SO 01.10.2026

Module code: WiMb21IN119

Hours per semester week / Teaching method:
-

ECTS credits:
6

Semester: according to optional course list

Mandatory course: no

Language of instruction:
German

Assessment:

conditions are fixed at the beginning of the lecture

[*updated 26.01.2023*]

Workload:
The total student study time for this course is 180 hours.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr.-Ing. Christian Köhler

Lecturer: Prof. Dr.-Ing. Christian Köhler

[*updated 26.09.2025*]

Learning outcomes:
After successfully completing this module, students will have received in-depth insight into the management of technologies and innovations. Students that have completed this module will:
... be aware of the sustainable importance of technologies and innovations.
... be familiar with the objectives, fields of activity and processes associated with strategic and tactical/operational technology and innovation management.
... be able to analyze technologies in a targeted manner, evaluate them on the basis of various factors and create application scenarios.
... be able to design and control innovation processes from initial ideas to diffusion, taking into account cultural and organizational influences.
... be able to apply selected innovation methodologies and tools (e.g. design thinking).

[*updated 26.01.2023*]

Module content:
Overall principles:
   Basics of technology and innovation management
   Goals and tasks of strategic and tactical/operational technology management

Innovation Management:
   Initiating innovations
   Developing innovations
   Implementing innovations
   Innovation controlling
   Innovation organization & innovation culture

Technology Management:
   Life cycle models
   Process and methods of early technology detection
   Process and methods for planning technology
   Process and methods for developing technology
   Exploiting and protecting technology

Assessing the impact of technology

[*updated 26.01.2023*]

Teaching methods/Media:
Lecture with exercises
The innovation management section is accompanied by a practical design thinking short project.
The technology management section will include case studies.

[*updated 26.01.2023*]

Recommended or required reading:
Corsten / Gössinger / Müller-Seitz / Schneider: Grundlagen des Technologie- und Innovationsmanagements. 2. Auflage, Vahlen, 2016
Hauschildt / Salomo / Schultz / Kock: Innovationsmanagement, Vahlen, 2016
Müller-Roterberg: Management-Handbuch Innovation. BoD, 2018
Schuh / Klappert (Hrsg.): Handbuch Produktion und Management 2   Technologiemanagement. 2. Auflage, Springer, 2011
Vullings / Heleven: Not invented here - Cross-Industry-Innovation, Hanser, 2016
Müller-Prothmann / Dörr: Innovationsmanagement - Strategien, Methoden und Werkzeuge für systematische Innovationsprozesse, Hanser, 2009
Lewrick / Link / Leifer: Das Design Thinking Playbook, Vahlen, 2018

[*updated 26.01.2023*]