Course Handbook Industrial Engineering Master

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Head of Studies	Prof. Dr. Rudolf Friedrich
Deputy Head of Studies	Prof. Dr. Frank Kneip
Chairman of Examination	Prof. Dr. Stefan Georg
Deputy Chairman of Examination	Prof. Dr. Susan Pulham

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	1	0BL	6	Prof. Dr. Stefan Georg
Contracts in Intellectual Property Law, Procurement and Distribution	WiMb21RS100		1	0PA	6	Prof. Dr. Sybille Neumann
Cost Analyses and Control	WiMb21WW101		1	0PA	6	Prof. Dr. Stefan Georg
Industry 4.0 & Hybrid Value Creation	WiMb21IN112		1	0PA	6	Prof. Dr.-Ing. Christian Köhler
Joining Technology	WiMb21NT111	P520-0019	-	-	6	Prof. Dr.-Ing. Jan Christoph Gaukler

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator
Machine Learning and Identification	WiMb21NT108		1	1SU+3PA	6	Prof. Dr. Frank Kneip
Materials Engineering of Metals and Plastics	WiMb21NT109		-	-	6	Prof. Dr.-Ing. Jan Christoph Gaukler
Technology and Innovation Management	WiMb21IN119		-	-	6	Prof. Dr.-Ing. Christian Köhler

(8 modules)

Industrial Engineering Master - mandatory courses

Industrial Engineering Master - optional courses

AI-Assisted Writing

Module name (EN): AI-Assisted Writing
Degree programme: Industrial Engineering, Master, ASPO 01.10.2021
Module code: WiMb21IN120
Hours per semester week / Teaching method: 0BL
ECTS credits: 6
Semester: 1
Mandatory course: no
Language of instruction: German
Assessment: Portfolio [*updated 23.09.2025*]

Workload:
The total student study time for this course is 150 hours.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Stefan Georg

Lecturer: Prof. Dr. Stefan Georg

[*updated 11.08.2025*]

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 Hochschul
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*]

Contracts in Intellectual Property Law, Procurement and Distribution

Module name (EN): Contracts in Intellectual Property Law, Procurement and Distribution
Degree programme: Industrial Engineering, Master, ASPO 01.10.2021
Module code: WiMb21RS100
Hours per semester week / Teaching method: 0PA
ECTS credits: 6
Semester: 1
Mandatory course: no
Language of instruction: German
Assessment: Project work [*updated 29.04.2024*]
Workload: The total student study time for this course is 150 hours.
Recommended prerequisites (modules): None.
Recommended as prerequisite for:
Module coordinator: Prof. Dr. Sybille Neumann
Lecturer: Prof. Dr. Sybille Neumann

[*updated 28.01.2020*]

Learning outcomes:
After successfully completing this module, students will:
- be familiar with the individual components of intellectual property protection in Germany, including the normative substantive requirements and the official registration procedure for the respective property right
- be familiar with the legal requirements for procurement and distribution contracts (excluding public procurement law)
- have acquired knowledge and skills in business contract management (national and cross-border contracts); and be able to analyze specific contract templates and implement them in the respective business negotiation and contract situation with the help of contract drafting techniques
- be able to draft specific contracts in intellectual property law and on the operational procurement and sales side, also using sample contracts.

[*updated 29.04.2024*]

Module content:
- Intellectual property rights in Germany (especially technical property rights)
- European and international intellectual property rights
- Freedom of contract and limits, drafting contracts in the areas of intellectual property rights, procurement and distribution, special features of transnational contracts and use of general terms and conditions
- Analysis of sample contracts, adaptation to specific business requirements and drafting of specific contractual provisions
- Basics of contract negotiation

[*updated 29.04.2024*]

Teaching methods/Media:
- Independent project work under supervision: students will draft a specific contract (also possible in English) pertaining to a given business situation
- The results of the project work must be documented in a suitable form
- Interactive lecture with case studies

[*updated 29.04.2024*]

Recommended or required reading:
- Bohnstedt, J.: Vertragsrecht im Einkauf. Wiesbaden: Springer Gabler, aktuelle Auflage
- Engels, R.: Patent-, Marken- und Urheberrecht. München: Verlag Franz Vahlen, aktuelle Auflage
- Fisher, R. u. a.: Das Harvard-Konzept. Der Klassiker der Verhandlungstechnik. Frankfurt: Campus, aktuelle Auflage
- Grützmacher u. a. (Hrsg.): Münchener Vertragshandbuch Band 3: Wirtschaftsrecht II. München: C. H. Beck, aktuelle Auflage
- Hasselblatt, G. (Hrsg.): Münchener AnwaltsHandbuch Gewerblicher Rechtsschutz. München: C. H. Beck, aktuelle Auflage
- Hoffmann-Becking M./Gebele, A. (Hrsg.): Beck sches Formularbuch Bürgerliches, Handels- und Wirtschaftsrecht. München: C. H. Beck, aktuelle Auflage
- Junker, A./Kamanabrou, S.: Vertragsgestaltung. München: C. H. Beck, aktuelle Auflage
- Martinek, M. u.a. (Hrsg.): Handbuch des Vertriebsrechts. München: C. H. Beck, aktuelle Auflage
- Lettl., T.: Gewerblicher Rechtsschutz. München: C. H. Beck, aktuelle Auflage
- Triebel, V.: Englisch als Vertragssprache. München: C. H. Beck, aktuelle Auflage
- Walz, R. (Hrsg.): Beck sches Formularbuch Zivil-, Wirtschafts- und Unternehmensrecht Deutsch-Englisch. München: C. H. Beck, aktuelle Auflage

[*updated 29.04.2024*]

Cost Analyses and Control

Module name (EN): Cost Analyses and Control

Degree programme: Industrial Engineering, Master, ASPO 01.10.2021

Module code: WiMb21WW101

Hours per semester week / Teaching method:
0PA

ECTS credits:
6

Semester: 1

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 150 hours.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Stefan Georg

Lecturer: Prof. Dr. Stefan Georg

[*updated 28.01.2020*]

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, ASPO 01.10.2021

Module code: WiMb21IN112

Hours per semester week / Teaching method:
0PA

ECTS credits:
6

Semester: 1

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 150 hours.

Recommended prerequisites (modules):
WiMb21IN119 Technology and Innovation Management

[*updated 31.10.2022*]

Recommended as prerequisite for:

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

Lecturer: Prof. Dr.-Ing. Christian Köhler

[*updated 28.01.2020*]

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*]

Joining Technology

Module name (EN): Joining Technology

Degree programme: Industrial Engineering, Master, ASPO 01.10.2021

Module code: WiMb21NT111

Hours per semester week / Teaching method:
-

ECTS credits:
6

Semester: according to optional course list

Mandatory course: no

Language of instruction:
German

Assessment:

[*updated 22.05.2023*]

Workload:
The total student study time for this course is 150 hours.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr.-Ing. Jan Christoph Gaukler

Lecturer: Prof. Dr.-Ing. Jan Christoph Gaukler

[*updated 29.03.2023*]

Learning outcomes:
After successfully completing this module, students will understand the basics of the structure and properties of metals with regard to their weldability. They will be able to explain the way in which joining production processes (fusion and pressure welding processes, adhesive bonding) work and what they can be used for. They will be able to select appropriate processes and identify and define their key manufacturing parameters to achieve the desired product properties.
This knowledge will enable them to evaluate the technical and economic suitability of metals and joining processes for the manufacture of established, as well as new products. Furthermore, they will be able to identify and solve technical joining problems that could for example, lead to undesirable product properties.

[*updated 22.05.2023*]

Module content:
Soldering: Fusion and pressure welding processes, weldability of metals and as a superordinate component property
Bonding: Basic principles, adhesive-friendly design, surface treatment of joined parts, adhesive classes

[*updated 22.05.2023*]

Teaching methods/Media:
Lecture, exercises, discussions
Documents, exercises, text books und scientific literature

[*updated 22.05.2023*]

Recommended or required reading:
W. Bergmann: Werkstofftechnik 1 und 2 (Carl Haser Verlag)
A. H. Fritz: Fertigungstechnik, Springer Vieweg
G. Habenicht: Kleben Grundlagen, Technologien und An-wendungen, Springer

[*updated 22.05.2023*]

Machine Learning and Identification

Module name (EN): Machine Learning and Identification

Degree programme: Industrial Engineering, Master, ASPO 01.10.2021

Module code: WiMb21NT108

Hours per semester week / Teaching method:
1SU+3PA (4 hours per week)

ECTS credits:
6

Semester: 1

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 150 hours (equivalent to 6 ECTS credits).
There are therefore 105 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 28.01.2020*]

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*]

Materials Engineering of Metals and Plastics

Module name (EN): Materials Engineering of Metals and Plastics

Degree programme: Industrial Engineering, Master, ASPO 01.10.2021

Module code: WiMb21NT109

Hours per semester week / Teaching method:
-

ECTS credits:
6

Semester: according to optional course list

Mandatory course: no

Language of instruction:
German

Assessment:

[*updated 22.05.2023*]

Workload:
The total student study time for this course is 150 hours.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr.-Ing. Jan Christoph Gaukler

Lecturer: Prof. Dr.-Ing. Jan Christoph Gaukler

[*updated 19.07.2021*]

Learning outcomes:
After successfully completing this module, students will be familiar with the way alloying elements work in Fe, Al, Ti, Cu and Ni and will be able to draw conclusions about the processing and service properties of low-alloy and high-alloy steels as well as Al, Ti, Cu and Ni alloys on the basis of the chemical composition. In addition, they will understand the alloy concepts of the steels commonly used in mechanical engineering as well as of Al, Ti, Cu and Ni materials, be able to describe their structure and properties and be familiar with their applications.
Students will be given an overview of the technically important polymer materials with regard to structural principles, thermal state ranges and deformation behavior and will be familiar with important processes in plastics technology.

[*updated 22.05.2023*]

Module content:
- Review of the structure and properties of steels
- Steels (unalloyed, low-alloyed and high-alloyed) and their application in mechanical, automotive and apparatus engineering
- Non-ferrous metals: Al, Ti, Cu and Ni materials
- Polymeric materials
  - Thermoplastics (amorphous, crystalline), duromers, elastomers, thermoplastic elastomers, fluidoplastics
  - Thermal state ranges and mechanical properties
  - Plastics technology

[*updated 22.05.2023*]

Teaching methods/Media:
- Lecture, exercises, discussions
- Documents, exercises

[*updated 22.05.2023*]

Recommended or required reading:

W. Bergmann: Werkstofftechnik 1 und 2 (Carl Haser Verlag)
E. Roos, K. Maile, M. Seidefuß: Werkstoffkunde für Ingenieure
G. W. Ehrenstein, Polymerwerkstoffe, Hanser-Verlag
G. Menges: Menges Werkstoffkunde Kunststoffe, Carl Hanser Verlag GmbH & Co.KG

[*updated 22.05.2023*]

Technology and Innovation Management

Module name (EN): Technology and Innovation Management

Degree programme: Industrial Engineering, Master, ASPO 01.10.2021

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 150 hours.

Recommended prerequisites (modules):
WiMb21WW105

[*updated 31.10.2022*]

Recommended as prerequisite for:
WiMb21IN112 Industry 4.0 & Hybrid Value Creation

[*updated 31.10.2022*]

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

Lecturer: Prof. Dr.-Ing. Christian Köhler

[*updated 19.07.2021*]

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*]