

# Qualification Objectives

## Master Applied AI for Digital Production Management

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"Applied AI for Digital Production Management"

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### **Gender Neutrality**

In order to maintain readability and clarity, the use of double forms or other designations of female, male and diverse genders is largely avoided. All designations for the various groups of university employees refer equally to members of all genders of the groups concerned.

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## **1 Course Objectives**

The consecutive, application-oriented master's programme "Applied AI for Digital Production Management" (MDM) is to allow diploma or undergraduate students of Industrial Engineering, Production Technology, Mechatronics, or closely related study programmes to substantiate their current findings obtained with theoretical knowledge in order to meet the challenges of modern research and development tasks in particular.

This study programme complements undergraduate or diploma studies in-depth and moreover, broadens the knowledge base. Graduates thus are to be qualified for creative work in research and development departments. Particularly qualified students additionally are to acquire the theoretical fundamentals required to pursue a doctoral programme or work in scientific fields.

## **2 Learning Outcomes of the Course**

The study programme consists of three semesters and is completed by an independent scientific paper (master's thesis). The master's programme is module-based and encompasses three study semesters. In total, students can acquire 90 ECTS credit points. The learning outcomes of the individual modules including their detailed objectives as well as the knowledge, skills, and competencies to be acquired by the graduates are further described in the module handbook for the master's programme "Applied AI for Digital Production Management" at the DIT. Within the module handbook, all modules are listed according to their respective module number of the study and examination regulations.

### 3 Study and Qualification Objectives

#### Professional and Methodological Competence

The international study programme is comprised of three semesters and is concluded with an independent scientific thesis (master's thesis). This master's programme has a modular structure and consists of three theoretical semesters. Altogether, students can obtain 90 ECTS credit points.

The master's programme "Applied AI for Digital Production Management" is to allow undergraduates of Industrial Engineering, Production Technology, Mechatronics, or other related study fields to deepen their knowledge and skills on digital production management systems that occur in industrial processes. The connection between the teaching content of Machine Learning, Data Analysis and Management as well as Intelligent Systems allows for the mediation of expert knowledge on innovative processes for data and information handling. Furthermore, apart from acquiring technical knowledge within the areas of Production, Logistics and Technology Management, students are to gain skills related to the successful integration of innovations into entrepreneurial processes. As an additional central component, data security is to raise students' awareness for the steadily increasing challenges in this area. Further vital teaching content encompasses quality and sustainability assurance within the digital production chain. For this purpose, they are to acquire the technical knowledge, skills and methods required to independently apply scientific findings and processes in the industry and service economy.

This master's programme is to qualify students for scientifically founded engineering work, amongst others, in the following fields:

- development, construction, and application of complex digital production systems in the following areas:
  - o digitalised production control
  - o information management for enhanced material and energy efficiency
  - o Real-time exchange of information, also via individual production plants
  - o Ergonomic visualisation of production data
  - o etc.
- Lead and management of technical projects
- Lead, production, installation, commissioning, and service
- Quality management and assurance
- Industrial Engineering

- Technology management
- Research and teaching

The master's thesis and the master's seminar account for students' ability to independently apply the skills and knowledge gained within the study course to complex tasks and to present those by writing and speaking in an appropriate form. By this way, students prove that they have acquired the ability for independent scientific work. The skills acquired found the basis for pursuing further studies, i.e., a doctoral degree in Production Technology or a related subject area.

### **Social and Personal Competence**

The master's programme "Applied AI for Digital Production Management" fosters social competence, communication, and presentation skills. Upon entry into professional life, the high level of practical relevance prepares students for socialisation and operational as well as scientific work environments. In addition to technical and methodological knowledge, corresponding management techniques as well as social competencies are equally conveyed.

The case studies integrated in three modules not only promote technical skills but also foster personal and social competencies. The case studies offer the ideal opportunity to apply theoretical knowledge gained from the respective modules into practice. Small student groups deal with individual scenarios. In the process, different solution approaches collide, which demands discussion to find a practical solution within the group eventually. Decision-making competencies are equally trained. Moreover, these case studies offer students the opportunity to consider problems from different angles. Theoretical knowledge relates to the analyses elaborated to understand and explain the respective scenario.

The case studies also prepare students ideally for their everyday working life by collaborating within a team. A group presentation on the findings obtained is also part of the case studies. Graduates of the master's programme "Applied AI for Digital Production Management" are skilled to present work results in a structured manner and to further discuss their findings in front of an expert audience. Furthermore, graduates are qualified to organise themselves independently and to demonstrate team skills as well as high leadership competence for interdisciplinary collaboration.

## 4 Learning Outcomes of the Modules / Module Objectives /Target Matrix

The individual modules, their adherent detailed objectives and the competencies graduates need to acquire are further described in the module handbook of this master’s programme. The following table establishes the link between the individual modules and the objectives of the master’s programme described in the previous section.

<b>Target Matrix of the Modules within the master’s programme "Applied AI for Digital Production Management"</b>												
Module	Objectives											
	Knowledge				Skills				Competencies			
	Scientific / Technical Fundamentals	Engineering Methodology	Engineering Practice and Product Development	Interdisciplinary	Scientific / Technical Fundamentals	Engineering Methodology	Engineering Practice and Product Development	Interdisciplinary	Scientific / Technical Fundamentals	Engineering Methodology	Engineering Practice and Product Development	Interdisciplinary
Module MDM-1 Machine Learning and Deep Learning in Production and Logistics	x	x	xx		x	x	xx		x	x	xx	
Module MDM-2 Advanced Statistical Methods & Optimization	x	xx	x		x	xx	x		x	xx	x	
Module MDM-3 Data Management		x	xx			x	xx			x	xx	
Module MDM-4 Production and Logistic Management			xx				xx	xx			xx	
Module MDM-5 Digital Tools in Development and Production		xx	xx			xx	xx			xx	xx	
Module MDM-6 Case Study "AI Project"			xx	xx			xx	xx		xx	xx	xx
Module MDM-7 Technology and Innovation Management	x	xx	xx		x	xx	xx		x	xx	xx	
Module MDM-8 Advanced Intelligent Systems		xx	xx			xx	xx			xx	xx	
Module MDM-9 Case Study Intelligent Systems in Production			xx	xx			xx	xx			xx	xx
Module MDM-10 Digital Production Systems		xx	xx			xx	xx			xx	xx	
Module MDM-11 Case Study Production Systems			xx	xx			xx	xx			xx	xx
Module MDM-12 Fachwissenschaftliches Wahlpflichtfach		x	xx	x		x	xx	x		x	xx	x
Module MDM-13 Quality and Sustainability	x	xx	xx		x	xx	xx		x	xx	xx	
Interdisciplinary Area												
Module MDM-14 Master Module			xx	xx			xx	xx			xx	xx

**Key:** xx strong reference; x intermediate reference