HS PF

Syllabus

DBM6102 Artificial Intelligence and Data Analytics

Prof. Dr. Thomas Schuster

Winter Semester 2025/26

Level	Master		
Credits	3		
Student Contact Hours	2 SWS		
Workload	90 h		
Prerequisites	-		
Time	Thursday, 15:30 pm – 17:00 pm Thursday, 17:15 pm – 18:45 pm		
Room	W1.2.04 , see Moodle for further details: https://lms.hs-pforzheim.de/course/view.php?id=7926		
Start Date	09.10.2025		
Lecturer(s)	**Name**	Prof. Dr. Thomas Schuster	
	Office	W2.2.24	
	Virtual Office	Book Online	
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Outline of the Course

Artificial Intelligence

In recent years, Artificial Intelligence (AI) has gained unprecedented importance, promising to revolutionize industries and societal functions while enhancing our living and working environments. These are a few reasons why AI is so important:

1. **Efficiency** and **productivity**: AI has the potential to significantly improve efficiency and productivity by automating routine tasks. For example, AI-powered chatbots can provide instant customer support, or AI algorithms can help doctors diagnose diseases more accurately.
2. Improved **safety**: AI can be used to identify potential safety risks in a variety of contexts, from self-driving cars to factory floors. AI algorithms can analyze data and alert humans to potential hazards, reducing the risk of accidents and injuries.
3. Improved **decision-making**: AI can analyze vast amounts of data and provide insights that humans might miss. This can help businesses make better decisions and governments to make more informed policies.
4. Advancements in **research**: AI can be used to simulate complex systems, such as the human brain, or to analyze large datasets, helping scientists to make breakthroughs in fields like medicine, chemistry, and physics.
5. **Personalization**: AI algorithms can learn from individual user behavior and preferences to personalize experiences, such as suggesting products or services that a user is likely to be interested in.

Overall, AI has the potential to revolutionize many industries and improve the quality of life for people around the world. As the technology advances, we can expect to see even more innovative applications and benefits emerge.

Course Content

Artificial Intelligence (AI) is propelling a transformative age in various sectors. This course delves into the core principles of Data Analytics and AI, analyzing their capabilities to address complex problems, the sophisticated methods employed to train models, and the inherent challenges and boundaries of these technologies. Participants will be introduced to a spectrum of algorithms, encompassing classification, regression, and advanced deep learning techniques such as convolutional neural networks (CNNs). The curriculum extends to practical applications in diverse domains like decision-making processes, computer vision, and natural language processing (NLP).

A pivotal segment of the course addresses the ethical considerations and societal implications of AI, fostering a dialogue on the responsible evolution and deployment of these technologies for societal benefit. The interactive format of the lectures, reinforced by individual and group tasks, promotes active participation. Students will engage in research, applying theoretical knowledge in practical settings, with the lecturer providing guidance in a coaching capacity. Course assessments include the presentation of project findings and the submission of a written paper, akin to a conference publication.

Complementing the theoretical learning, lab exercises offer hands-on experiences with different platforms at varying levels of abstraction. Basic coding tasks will be carried out in **Google Colab**. For more advanced analytics, students will work with **SAS Viya for Learners** and, for programming-affine participants, the **SAS Workbench**. Additionally, students will gain experience with **KNIME** as a second low-code environment for building and deploying analytics workflows. This combination ensures both coding-based and low-code/no-code perspectives on AI and data analytics. Practical sessions encompass setting up environments, data importation and preprocessing, exploratory data analysis, and model development. Students will apply algorithms using different libraries.

Real-world data sets serve as the foundation for lab exercises. The course culminates in the acquisition of practical skills in the deployment of AI models, empowering students to integrate these tools into their own projects.

Course Intended Learning Outcomes and their Contribution to Program Intended Learning Outcomes / Program Goals

Program Intended Learning Outcomes		Course Intended Learning Outcomes	Assessment Method
	After completion of the program the students will be able…	After completion of the course the students will be able…	Project Work 100% Collective
1	**Responsible Leadership in Organizational Contexts**		
1.4	...to act responsibly from a scientific self-understanding and professional self-image.	… to critically reflect on the ethical and societal implications of Artificial Intelligence technologies and act responsibly in their development and deployment.	x
2	**Creative Problem-Solving Skills in a Complex Business Environment**		
2.2	…to analyze problems of Digital Business Management.	… to analyze challenges and opportunities in Digital Business Management by leveraging Artificial Intelligence for improving decision-making, efficiency, and innovation.	x
2.3	…to develop and evaluate creative solutions to complex problems of Digital Business Management.	… to develop and assess creative AI-driven solutions for complex business problems using advanced algorithms such as deep learning, computer vision, and natural language processing.	x
2.5	… to utilize digital tools and technologies to solve complex business problems.	… to apply and implement digital tools and AI technologies to address complex business challenges, using both coding-based environments (e.g. Colab) and low-code or enterprise platforms (e.g. SAS Viya, SAS Workbench, KNIME).	x
3	**Applied Research Skills**		
3.3	…to generate novel and goal oriented insights for Digital Business Management through empirical research or data analysis.	… to conduct empirical research using AI techniques, generating novel insights into Digital Business Management through the use of machine learning models and data analytics.	x
3.4	...to effectively present and discuss research findings in professional settings.	… to present research findings on AI applications in business, both in written form akin to a conference publication and through oral presentations, demonstrating the ability to articulate complex topics to diverse audiences.	x
4	**Interdisciplinary and agile working**		
4.2	…to design and manage Digital Business Management projects independently and on their own responsibility.	… to independently manage and execute AI-driven Digital Business projects, applying interdisciplinary knowledge and agile methodologies to ensure effective project delivery.	x

Teaching and Learning Approach

This event focuses on students in a master's degrees at the Faculty of Economics and Law at the University of Pforzheim. The lecture is accompanied by exercises (lab exercises, practical cases, and a group project) that enable students to use and develop machine learning models. In addition to the lectures and exercises (approximately 30 hours in attendance), students are expected to spend time in self-study, approximately: about 15 hours of preparation, 40 hours of project work, pre- and post-processing of the lectures (including literature studies) and finally 5 hours to prepare the presentation of the problem solving.

The lecture will be held in a seminar style to impart the necessary knowledge in artificial intelligence methods and tools. While basic programming knowledge will be introduced through small exercises in **Google Colab**, the main focus is on working with higher-level platforms. Students will explore **SAS Viya for Learners**, the **SAS Workbench** for programming-oriented tasks, and **KNIME** as a low-code platform. The seminar style emphasizes practical application and critical reflection rather than advanced coding. It is expected that each student will actively participate in the lecture.

Literature and Course Materials

Literature and course contents can be found at:

https://lms.hs-pforzheim.de/course/view.php?id=7926

Assessment

The course grade will be based on a final project, which must be submitted by the middle of the semester, aligned with the end of the lecture period. Detailed instructions and deadlines will be available in our learning management system.

The following evaluation scheme is used: 'Very good' means exceptional performance that is far above the average. 'Good' means good performance that is above the average. 'Satisfactory' means average performance, which certainly has shortcomings, but basically complies with the requirements. 'Adequate' means underperformance with conspicuous defects. 'Poor' means not acceptable performance, which no longer complies with the requirements.

Academic Integrity and Student Responsibility

In general, I expect that you will be using code, examples, and ideas from many different websites and resources for your exercises. This is allowed within reason. Wholesale copying of entire pro-jects is definitely not allowed. Using code to round out a feature is allowed. If you ever have a question about what is or is not appropriate, ask first!

In all cases, you need to cite all sources at the top of the file where the code or algorithm was used, and you should note all sources in your documentation. Failure to properly attribute your sources will result in failing the complete lecture.

Code of Conduct for online Teaching

In this course, there will be a focus on working well together and learning about the development process. A large portion of that process involves interpersonal skills and conflict management. Students and staff are all expected to treat each other with respect. This includes, but certainly is not limited to:

- Excessive web browsing during class
- Disrespectful language
- Promptness for all deadlines and class meetings
- Quality work
- Not working well with your partner
- Collaborating with other teams
- Be fair to the other students!
- Be punctual and do not leave early!

The number one problem with professionalism in class is the overuse of laptops and mobile devices. Taking notes on a laptop and following along with the slides is welcome and encouraged. Doing work for other classes, watching videos, chatting, or anything else that distracts from your ability to learn and follow along (or anyone around you), will result in a professionalism penalty. Students can and will be penalized for unprofessional behavior.

Your class work might be used for research purposes. For example, we may use anonymized student assignments to design algorithms or build tools to help programmers. Any student who wishes to opt out can contact the instructor or do so after final grades have been issued. This has no impact on your grade in any manner.

In addition, please be aware and follow rules as explained in the University's online code of conduct:

Code of Conduct for online Teaching

Teaching Philosophy

I am always happy to serve as conversation partner and support you with advice. Please contact me during the lecture or via teams (or e-mail).

I am willing to contribute to your successful learning and provide an understanding of the practical impacts of the learning content. Comprehension questions should, if possible be equated during the lessons. Your comments, which serve the progress of all others are also welcome. Also, suggestions for improvements, and constructive criticism are very welcome. My goal is that you can successfully pass the exam, however a major part of the work is up to you.