

Syllabus
BIS5151 Generative AI
Prof. Dr. Manuel Fritz, MBA
Winter Semester 2025/26

Level	Master	
Credits	3	
Student Contact Hours	2 academic hours: (2 x 45 minutes) / per week	
Workload	90 hours, 30 hours within class and 60 hours for self-study and term project	
Prerequisites	Basic knowledge in Computer Science and Programming	
Time	Wed, 17:15 – 18:45	
Room	W1.5.06	
Start Date	01.10.2025	
Lecturer(s)	Name	Prof. Dr. Manuel Fritz, MBA
	Office	W2.2.26
	Virtual Office	MS Teams
	Office Hours	Wed, 14:30 – 16:00 Please use my booking system to reserve a free timeslot.
	Phone	TBD
	Email	manuel.fritz@hs-pforzheim.de

Summary

In this course, students will learn about the fundamental concepts of generative artificial intelligence (GenAI). To this end, we will investigate the differences between generative AI and discriminate AI, and understand why both approaches are important for today's businesses. Subsequently, we will understand the ideas behind generative AI and investigate current trends in research and in businesses. Students are encouraged to use current GenAI approaches, either out-of-the-box or extend existing approaches with latest trends. To this end, we will have massive hands-on exercises on our local machines or the AI lab. After successfully completing this course, students (a) are aware of the concepts used in GenAI, (b) understand current trends, and (c) can understand and use different GenAI models on their own.

Outline of the Course

This course provides an in-depth introduction to the rapidly evolving field of Generative Artificial Intelligence (GenAI). It aims to equip students with a foundational understanding of the principles, architectures, and applications of GenAI, while also fostering a critical perspective on its potential and limitations.

The course begins by motivating the relevance of GenAI in today's technological and business landscape, introducing core concepts and historical developments that have led to recent breakthroughs. Students will explore the fundamental building blocks of modern GenAI systems, including the architectures and mechanisms that enable them to generate text, code, and other types of content.

From there, we will examine how GenAI is applied in practice across different domains, highlighting real-world use cases and economic opportunities. Special attention will be given to the challenges and risks of deploying generative models, such as biases, hallucinations, and legal considerations, along with the trade-offs between open-source and proprietary approaches.

Throughout the course, students will gain hands-on experience through guided lab activities, making use of locally available large language models. These exercises will encourage experimentation and help bridge the gap between theoretical knowledge and practical application.

In the final part of the course, students will work in small groups on a project of their choice, focusing on a specific GenAI concept. Each group will present their findings and a small demonstration to the class, expanding the overall learning experience with diverse perspectives.

By the end of the course, students will have developed the knowledge, skills, and critical mindset to understand, evaluate, and apply GenAI in academic and professional contexts.

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

Program Intended Learning Outcomes	Course Intended Learning Outcomes	Assessment Methods		
		Presentation	Laboratory Work	Term Paper
		30%	30%	40%
		Individual	Individual	Individual
1. Responsible leadership in organizational contexts				
1.1 Students are acquainted with numerous relevant management principles. They are able to explain and discuss them discerningly.				
1.2 Students are able to apply management principles within an organizational context.				
1.3 Students are able to reflect discerningly and critically on diverse management principles within an organizational context.	to critically evaluate the opportunities and risks of Generative AI, including social implications in various organizational scenarios.	X		X
1.4 Students comprehend the challenges of ethics and sustainability for responsible business operations and are able to deal with them.	to understand the challenges of ethics, fairness, legal, and sustainability in AI adoption and can assess their impact on responsible business practices.	X		X
2. Creative problem solving skills in a complex business environment				
2.1 Students are able to recognize and define problems as well as assess their importance.	to recognize and define problems where Generative AI can contribute to innovative solutions, and assess the potential benefits and risks.	X	X	X
2.2 Students are able to analyze complex in-company and inter-company problems and challenges from different perspectives and/or within an international context.	to analyze complex business and technical challenges related to Generative AI from multiple perspectives, including organizational, economic, and technical viewpoints.	X	X	X
2.3 Students are independently able to develop creative solutions to complex in-company and inter-company problems and challenges.	to develop creative, AI-driven solutions to business and technical problems, integrating both theoretical and practical knowledge.	X	X	X
2.4 Students are successfully able to clarify complex problems and solutions to both experts and laymen.	to clearly present complex AI concepts, solutions, and demonstrations to both technical and non-technical audiences, adapting their communication style as needed.	X	X	X
3. Research skills and their practical application				
3.1 Students are acquainted with research methods relevant to engineering and management as well as their advantages and disadvantages.				
3.2 Students are successfully able to apply research methods relevant to engineering and management.	to apply appropriate research methods to investigate technical and organizational questions related to Generative AI.	X		X
3.3 Students are able to implement relevant research methods in such a way as to deliver reliable and innovative results.	to design and implement research approaches that produce reliable and innovative findings in the field of Generative AI, supported by practical demonstrations.	X	X	X
4. Design skills for specific IT management solutions or IT technology management architectures within complex process structures				
4.1 Expert Knowledge in IT	to demonstrate expert knowledge of Generative AI technologies, architectures, and tools, and can relate them to IT management contexts.	X	X	X

4.2	Application Transfer of Problem Solving Methods for IT-specific Problems	to transfer problem-solving methods to design IT-specific solutions that integrate Generative AI into complex process and system architectures.	X	X	X
4.3	Critical Analysis and Problem Solving for IT-specific Problems	to critically analyze IT-specific challenges and develop viable, AI-driven solutions, taking into account technical feasibility, scalability, and governance aspects.	X	X	X

Teaching and Learning Approach

Welcome to Generative Artificial Intelligence – one of the most dynamic and transformative areas in today's technology landscape. This course is both intellectually stimulating and highly relevant for your future professional development. Together, we will explore how Generative AI models work, where they can be applied, and how they can be critically evaluated to ensure responsible and effective use in business and technology contexts. You will gain the skills to understand, experiment with, and design AI-driven solutions, while developing the ability to communicate complex AI concepts to diverse audiences.

We will examine the fundamental architectures behind Generative AI, investigate their practical applications in areas such as text, code, and image generation, and discuss the economic, ethical, and legal implications of their use. The course will provide you with both a strong theoretical foundation and practical experience in working with local large language models (LLMs) and related tools.

The learning approach combines interactive lectures, hands-on laboratory sessions (e.g., in the AI Lab and on your local machine), scientific approaches, and project-based work. Early in the semester, you will be assigned with a case study individually or in a group work. Your project will include both a conceptual analysis and a live demonstration, culminating in a presentation during the final sessions of the course. You will close this course by writing a short scientific term paper, which summarizes your new knowledge in the area of GenAI. These activities will strengthen your understanding of theoretical concepts and give you the opportunity to apply them in practical settings.

Active participation is essential, as the course thrives on discussion, peer feedback, and collaborative exploration of emerging AI technologies.

Literature and Course Materials

- Vaswani, A., Shazeer, N., Parmar, N., Uszkoreit, J., Jones, L., Gomez, A.N., Kaiser, Ł. and Polosukhin, I., 2017. Attention is all you need. Advances in neural information processing systems, 30.
- Goodfellow, I., Bengio, Y., Courville, A. and Bengio, Y., 2016. Deep learning (Vol. 1, No. 2). Cambridge: MIT press. Available at <https://www.deeplearningbook.org>
- Liu, A., Feng, B., Xue, B., Wang, B., Wu, B., Lu, C., ... & Piao, Y. (2024). Deepseek-v3 technical report. arXiv preprint arXiv:2412.19437.
- Wei, J., Wang, X., Schuurmans, D., Bosma, M., Xia, F., Chi, E., Le, Q.V. and Zhou, D., 2022. Chain-of-thought prompting elicits reasoning in large language models. Advances in neural information processing systems, 35, pp.24824-24837.
- Touvron, H., Lavril, T., Izacard, G., Martinet, X., Lachaux, M.A., Lacroix, T., Rozière, B., Goyal, N., Hambro, E., Azhar, F. and Rodriguez, A., 2023. Llama: Open and efficient foundation language models. arXiv preprint arXiv:2302.13971.
- Alamar, J. and Grootendorst, M., 2024. Hands-on large language models: language understanding and generation. " O'Reilly Media, Inc."

Assessment

You will receive a subject for your individual work. Based on this subject, you will write a term paper (see 1), provide a presentation (see 2), and an implementation (see 3).

(1) Term paper

The subject of the term paper is given by the assignment. You have a assigned article or book chapter which provides you with the conceptual base and theoretical foundation to understand and implement a specific aspect in the area of GenAI. Your research should not be limited to this initial literature.

In ideal case, your paper comprises 10 pages (line spacing 1.5, 2 cm margin at each side, font size 12 pt). The paper should have a clear structure and your writing should focus on the main topics and messages of the paper. From a formal point of view, the writer is advised and recommended to adhere to the "The Business School Guidelines for Preparation of Academic Papers" (see e-learning platform (Moodle)). Certainly, the assessment and evaluation criteria will be explained and will be transparent for you. They will be available on the companion website of the university's e-learning platform (<https://elearning.hs-pforzheim.de>).

Each student and study team should make use of the possibility to come to my office during my office hours (colloquium) to discuss its proposed outline of the conceptual paper presentation, your term paper, as well as the case study presentation. Take this opportunity to get advice and to synchronize regularly with the course instructor.

You will receive further instructions and guidance during the first sessions of the lecture. Some of the arrangements will be based on the total number of participants and signed in students.

The term paper has to be turned in one week after the last course session, which will allow you to constantly develop the contents of the paper, based on what you hear and learn in class. Presentations have to be submitted in draft version before in due time before your presentation, so that you will be able to incorporate comments and suggestions for improvement made by the course instructor. We will follow the principle of co-creation to elaborate your individual and group interventions. Final presentations have to be submitted two weeks prior the presentation in class. Feedback provided by the course instructor should then be incorporated into the term paper.

Some suggestions for preparing the term paper:

- In making your time-determination, it is usually a good strategy to double your original guess as to how much time you think you may need.
- A second and very important strategy is to keep, as a precaution, a block of time free around the paper's due-date.
- Start with reading the suggested material.
- Gather and evaluate additional information if it is necessary, please remember that you should use relatively recent articles and books written by academically acknowledged authors. Plagiarism, in any of its forms, and whether intentional or unintentional, violates standards of academic integrity.
- Write a first brief summary and outline of your paper => discuss with you fellow colleagues or course instructor
- Your outline should mirror the standard structure of an academic essay, which consists of an introduction, the main body, and the conclusion.
- In the introduction, you want to present in a paragraph or two the background information surrounding your topic and state what your specific focus will be (thesis).

- The bulk of your paper is the body of your paper and consists in the systematic delineation of your main purpose, arguments, etc., as stated in your introductory paragraph or paragraphs.
- The paragraphs making up the body of your paper should gradually add support for, and clarification of, your main thesis.
- Similarly, each paragraph begins with a "topic sentence," which indicates what the purpose of the paragraph is - and each sentence in each paragraph should likewise add support and clarity to the paragraph's topic sentence.
- Don't attempt to make every sentence and paragraph fit perfectly into this schema - good writing cannot be reduced to such a formula!
- The summary and conclusion bring you back once again to the main points described in your introduction. You are done providing new information in support of your term paper (scientific text) and are rapping things up.

(2) Presentation

The presentation will be held during the course of the lecture. In the presentation, you will discuss selected aspects, including (but not limited to) the following:

- The motivation for your subject: Why is it important? Set the scene for your topic with respect to technic and business.
- Describe the actual goal of your assessment. What should be investigated?
- Present the underlying concepts with respect to what you learned so far about GenAI in the lecture. How does this extend the fundamentals from the lecture?
- Discuss the literature you used for the assessment.
- Guide through your implementation. Present important aspects you learned.
- Summarize how you solved the case study.
- Provide an outlook of how the case study might evolve in the future with respect to everything you learned so far (literature, implementation, ...)

(3) Implementation

You will provide a small implementation based on certain aspects of GenAI. This implementation needs to be submitted. It must be reproducible, such that the course instructor can validate your approach and the corresponding results.

Teaching Philosophy

The lecturer will do anything to support your individual learning process. If you have problems or questions, please speak up in class, contact me personally or schedule a meeting with me. If you have problems with your progress in the course or with a teammate or your team, please see me as early as possible. The longer you wait the fewer options I will have to intervene and to help you.

Student responsibilities and class behaviour

- Read the course syllabus
- Ask as many questions, whenever you have problems to understand something
- Respect each other
- Take responsibility for your action
- Demonstrate professional attitude and professionalism
- Be open and fair
- Act with honesty
- Demonstrate civility
- Arrive to class on time and do not leave early

- Demonstrate and respect divergent opinions
- No smartphones in class