

## MADS-EMGAI - Generative AI

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General information	
<b>Module Code</b>	MADS-EMGAI
<b>Unique Identifier</b>	GenAI-01-MA-M
<b>Module Leader(s)</b>	Prof. Dr. Prange, Michael (michael.prange@haw-kiel.de)
<b>Lecturer(s)</b>	Brede, Max (max.brede@haw-kiel.de) Klick, Alwin (alwin.klick@haw-kiel.de)
<b>Offered in Semester</b>	Wintersemester 2026/27
<b>Module duration</b>	1 Semester
<b>Occurrence frequency</b>	Regular
<b>Module occurrence</b>	In der Regel jedes Semester
<b>Language</b>	Englisch
<b>Recommended for international students</b>	Yes
<b>Can be attended with different study programme</b>	Yes

Curricular relevance (according to examination regulations)
Study Subject: M.Sc. - DS - Data Science Module type: Wahlmodul Semester: 2
Study Subject: M.Sc. - MCS - Computer Science (PO 2023, V1) Module type: Wahlmodul Semester: 1, 2

Qualification outcome
<i>Areas of Competence: Knowledge and Understanding; Use, application and generation of knowledge; Communication and cooperation; Scientific self-understanding / professionalism.</i>
Students - know the fundamentals of generative AI systems. - know various modern applications of generative AI systems. - know the theoretical foundations and practical applications of generative AI systems.
Students - are able to explain and apply various open-source language models. - are able to implement and utilize agent systems and their functionalities. - are able to understand and use embeddings and vector stores for semantic search and recommendations. - are able to explain and practically apply different methods for image generation. - are able to fine-tune large language models (LLMs) and diffusion models for specific tasks.
Students - are able to successfully organize teamwork for generative AI projects. - are able to report and present team solutions for practical project tasks. - are able to interpret and communicate the approaches in technical and functional terms.
Students - are able to work professionally in the field of generative AI systems. - are able to give and accept professional feedback to different topics of generative AI systems. - are able to select relevant scientific literature about generative AI systems.

<b>Content information</b>	
<b>Content</b>	<p>Open Source Language Models</p> <ul style="list-style-type: none"> <li>- Overview of model lists</li> <li>- Ollama</li> <li>- Generation of synthetic text as training sets</li> </ul> <p>Agent Systems</p> <ul style="list-style-type: none"> <li>- Llamaindex, LangChain &amp; Haystack</li> <li>- Function calling</li> <li>- Data analysis</li> </ul> <p>Embeddings and Vector Stores</p> <ul style="list-style-type: none"> <li>- Semantic Search</li> <li>- Retrieval-augmented generation</li> <li>- Recommendations</li> </ul> <p>AI Image Generators</p> <ul style="list-style-type: none"> <li>- Generative Adversarial Networks (GANs)</li> <li>- Variational Autoencoders / Diffusion Models</li> <li>- Generative approaches for image dataset augmentation</li> </ul> <p>Fine-Tuning of LLMs and Diffusion Models</p> <ul style="list-style-type: none"> <li>- Examples: LoRA, QLoRA, MoRA</li> </ul>
<b>Literature</b>	Presentation slides

<b>Teaching formats of the courses</b>	
<b>Teaching format</b>	<b>SWS</b>
Lehrvortrag + Übung	4

<b>Workload</b>	
<b>Number of SWS</b>	4 SWS
<b>Credits</b>	5,00 Credits
<b>Contact hours</b>	48 Hours
<b>Self study</b>	102 Hours

<b>Module Examination</b>	
<b>Examination prerequisites according to exam regulations</b>	None
<b>MADS-EMGAI - Portfolioprüfung</b>	Method of Examination: Portfolioprüfung Weighting: 100% wird angerechnet gem. § 11 Absatz 2 PVO: No Graded: Yes

<b>Miscellaneous</b>	
<b>Recommended Prerequisites</b>	Basic knowledge about Deep Learning and Natural Language Processing. Basic practical experience in Python programming.