TECHNISCHE UNIVERSITÄT DARMSTADT

Guidelines on generative AI for students and lecturers at TU Darmstadt

Dated: 10 July 2025

Version 1.0

The purpose of these guidelines is to provide basic knowledge regarding the use of AI in teaching and to highlight the didactic and legal issues associated with it. This is an informative document that was created as part of the LeNA project '*AI-Literacy in Studium und Lehre* – AI-Literacy in Study and Teaching' in cooperation and coordination with the Vice President for Teaching and the Directorate II. We would like to take this opportunity to thank the 'AI guidelines' interest group consisting of lecturers and students who collaboratively develop this document. It contains recommendations on how to use AI in teaching and supervision in the departments. The document does neither draw any definitive conclusions nor claim to be complete, particularly with regard to legal matters. The AI guidelines are updated regularly.

Please send any questions, suggestions for change, or feedback to:

Dr. Annette Glathe (HDA), annette.glathe@tu-darmstadt.de

Jan Hansen (Directorate II), jan.hansen@tu-darmstadt.de

Table of contents

Part 1: For students and lecturers

1 Introduction: AI competence in study and teaching

Generative artificial intelligence (AI) is advancing rapidly. It will increasingly become part of everyday life and the world of work. Lecturers and students at TU Darmstadt will develop their AI competencies so that they can use AI efficiently and responsibly or decide against its use in specific cases. Graduates of TU Darmstadt need to be able to assess what generative AI can achieve, where its weaknesses and limitations lie and how they can use it responsibly.

1.1 Objectives and motivation of the guide

The purpose of this guideline is to provide tips and background knowledge for lectures and students in order to

a) Boost their general AI competence;

b) Use an AI tool in their studies and teaching in a way that is as ethically sound as possible and in compliance with legal requirements;

c) Use an AI tool in accordance with good scientific practice;

d) Rethink teaching and examination formats with regard to the possible use of AI tools, and to adapt them as necessary.

2 Ethical aspects of using AI

As lecturers and students at TU Darmstadt, please bear in mind that while the use of AI offers many opportunities, there are also significant ethical issues involved that you need to consider in order to adapt your actions accordingly. The responsible use of AI also includes discussing these issues in your courses. The following are examples of topics that need to be discussed on a course-specific basis:

2.1 Required resources

The energy required for calculations and other resources required for artificial intelligence hardware are enormous. Has the necessity of using artificial intelligence been considered? AI is to be used in a purposeful and resource-efficient manner.

2.2 Risks and concerns

How can potential negative effects of artificial intelligence be prevented or mitigated? Important issues are, for example, spying on users, the lack of clarity about the later use of data entered, or political influence encountered through AI tools. In many disciplines, there are topics that need to be viewed very critically, such as the dangers of autonomous weapons systems or wrong decisions made by AI in autonomous driving. Another important topic for teaching is the impact of AI on the labour market (such as job losses and changing roles) and its impact on future career opportunities of students.

2.3 Exploitation of human creativity

Commercial AI providers use data available online for their business model. Copyrights in the cultural and creative industries, but also in science, academia and research, are not respected. This requires that we need to publicly discuss the issue of how financial compensation for copyright owners can be secured.

2.4 Risks of discrimination

AI models can reinforce existing biases in training data. These biases can lead to decisions and/or choices that have a negative impact on certain groups. These include, for example, the potential for automated application and admission procedures that could distort opportunities in the future. Students at higher education institutions are also affected by pen-and-paper written exams that are proctored or monitored. For example, automated evaluation might mark a box as ambiguous even though a human examiner would clearly identify it as check marked. One might ask: What biases does the use of AI produce, and how can these biases be avoided?

2.5 Requirements stated in the European Artificial Intelligence Act (AI Act)

Recital 56 of the European Artificial Intelligence Act classifies AI systems that are used, e.g., for determining admission or placement decisions, for evaluating learning outcomes, or for monitoring and detecting prohibited behaviour during examinations as high-risk AI systems. Special requirements in accordance with the European Artificial Intelligence Act (AI Act) apply to high-risk AI systems.

2.6 Recommendations for consolidation

Here you will find a list of links and literature on AI and ethics, which lecturers and students can use to learn more about the subject.

3 Using an AI tool: What decisions need to be made and what needs to be considered?

Careful consideration, weighing up the pros and cons, and making decisions are required when moving from contemplating the use of an AI tool to actually using AI-generated content for academic purposes. This subchapter will see you through this process step by step.

3.1 Before and when using an AI tool

The process begins with the question: Is the intended use fundamentally **ethically justifiable** (see Section 2 'Ethical aspects of using AI'), including from a **scientific, academic, and research perspective** (see Section 5 'Good scientific practice and use of AI')?

Next you must clarify whether you need to register and, if so, what (personal) data do you need to disclose? Are there any costs associated with licensing? How is the AI tool set up and put in operation? Is it enough to open a website in a browser or is it necessary to install special software on the PC?

3.1.1 Subsequent use of user-entered data by AI provider

Generally speaking, there is a potential risk that data entered into an AI tool — including prompts, PDF files, or copied text — will be stored by the AI tool provider (e.g., OpenAI) and reused as training material etc. Many AI tool providers are currently based in the United States of America or China. According to the 'Schrems II' judgement of the European Court of Justice, it is not possible to control what happens to data entered into AI tools.

3.1.2 Infringements of copyright or invasion of personal privacy

Copyrighted material must not be entered in AI tools. It is unwise to upload unpublished scripts or text passages, too. Hence, never upload third-party material in the AI tool if you do not have permission to do so. Even if the material is your own, it would be wise to consider potential harm caused by uploading it. It is recommended to solely use AI tools that do not save or use prompts. You can find a list of suitable AI tools here in the AI toolbox on the *einfachlehren* information portal for training in higher education. Copyright must also be observed for image and audio material. If, for example, this data contains voice recordings of fellow students or if the images show identifiable individuals, this can constitute a violation of their personal rights. Anyone who violates these rights is liable to injunctive relief and claims for damages.

3.1.3 Uncontrolled use of personal data by AI providers

For data protection reasons, it must be ensured that your personal data, such as your name, email, IP address, location, will not be processed for AI training purposes without your consent. It must also be ensured that login data will not be sold just because you are using the AI tool. You must also be careful not to include personal data in prompts. It is only permissible to include the personal data of people in prompts if they are permanently or temporarily in the public eye. There are only a few AI tools that give users the options to disable data storage or reuse. Especially when using free versions, it is often the case that data entered is processed in some way to generate a profit. When choosing an AI tool, a paid version with the right settings is the better choice from a data protection perspective. Always review the privacy policy of the respective provider beforehand and disclose as little personal or sensitive information as possible.

3.1.4 Theft of intellectual property

Before entering data into the AI tool, consider whether it contains innovative ideas, insights or knowledge that do not belong to you. Third parties could acquire this information against your will and misuse it for their own purposes. Never disclose knowledge that is not (yet) intended for others and is to be treated confidentially.

3.1.5 Prompting

If the input into the AI tool is in natural language, it is referred to as prompting. Basically: The less precise the prompts are, the more leeway the AI model has to solve the given problem. More flexibility can boost creative ideas, but it can also lead to unwanted “hallucinations.” Specific prompts, i.e., detailed work instructions and background information, can and should be used to customise the output to your own needs. The less freedom the system is given by complex prompts, the more reliable the response will generally be. Using English prompts can generate better results in some circumstances, as most AI models’ training data tends to have been in English.

3.2 Evaluation of AI-generated content

The scientific evaluation of AI-generated content requires careful examination in terms of factual accuracy, transparency and source material.

3.2.1 Scientific evaluation

The following questions can be used for scientific evaluation purposes:

- Are the contents factually correct? Check the output based on your own knowledge, plausibility, and other sources. AI tools can “hallucinate.”

- Are sources referenced?
- Are the sources verifiable and factually accurate?
- Are any decisions/evaluations transparent, comprehensible and well-founded?
- What other criteria need to be considered in your specialist context/department?

3.2.2 Ethical and critical evaluation

AI-generated content can be biased due to insufficient, inappropriate or unrepresentative training data. However, technical implementations of special guidelines on the part of the provider can also distort the AI-generated content in a specific manner or limit the functionality of the AI tool. These reasons can, for example, lead to disadvantages or discrimination against groups of people. In addition, it is crucial to critically examine and compare statements with other sources to get the complete picture.

3.3 Using AI-generated content

If the AI-generated content is to be used in an academic context, a number of requirements must be met. AI systems are not human; thus, they have no rights on the output that they generate. It is you, who is solely responsible for how you use AI tools and the content that they generate.

3.3.1 Using and documenting AI-generated content from an academic integrity perspective

Good scientific practice requires the identification of third-party contributions and the citation of sources (see Section 5.1 'Labelling and documenting AI-generated contents clearly in academic, scientific and scholarly works').

3.3.2 Quotations and references from the perspective of copyright law

In order to be able to use other works for your own elaboration, the German *Urheberrechtsgesetz* – Act on Copyright and Related Rights requires that you cite the source. Generative AI tools can usually extract content from other works. However, they frequently fail to cite their sources, which makes proper citation impossible. For this reason, information provided by an AI tool must be verified and substantiated with conventional sources.

3.3.3 Original authorship

Copyright law can only protect man-made products, which is why an AI-generated text does not enjoy copyright protection. However, it is possible that the texts used by the AI tool to generate its output enjoy copyright protection, see below. As a result, AI tools cannot be named as authors of texts. In contrast, prompts are generated by people. If these prompts stand out from other prompts due to their particularly good quality, they are protected by copyright as original intellectual creations of the authors.

3.3.4 Third-party authorship and plagiarism

AI-generated content can include intellectual property of other authors without the AI naming the source. This means that you could unknowingly copy text passages that are protected by copyright and therefore need to be quoted. Even if the copyright infringement is unintentional, you are liable for the infringement of the rights of others. If third-party contents are not cited as such, you are not only violating copyright law but also the rules of good scientific practice. Students will be charged with this under examination law as an attempt to deceive (see Section 5.3 'Potential attempts to deceive'), which can result in a failing grade or even deregistration (*Exmatrikulation*). But unintentional plagiarism can have drastic consequences for lecturers, too. When writing papers for academic or research purposes, always check AI-generated content against relevant sources such as books or peer-reviewed articles.

In all cases, students / academic researchers must know that they are responsible for the contents of their work.

4 Use cases for students: Using AI-generated content in your studies

'AI' is integrated into many digital aids, which is why a precise categorisation of AI-generated content is so important for lecturers and students. This classification is intended to help students to understand which forms of use are permitted and which must be clearly labelled. The following is a rough categorisation (based on Perkins et al., 2024).

4.1 Levels of AI generation

The use of artificial intelligence in studies and academic research can vary in intensity and objective. To provide guidance on which forms of using AI are permissible or problematic from a didactic, ethical and legal perspective, seven typical use cases are distinguished and categorised below.

4.1.1 Fully AI-generated

- The AI creates content independently based on a prompt, without significant human intervention.
- Examples: An AI-generated paragraph in a homework assignment, code, image or summary without any post-editing.

These contents <u>must not</u> be used in homework assignments, written papers or theses (*Prüfungsarbeiten*), and academic-research papers because they are not reproducible sources, can be incorrect or superficial, contradict the principles of academic and scientific rigour, and diminish our ability to think for ourselves and learn. Exception: Whenever AI-generated output itself is the subject of learning and reflection or serves an academic-research purpose. In this case, AI-generated output must be clearly labelled or documented.

4.1.2 AI-powered brainstorming with significant human refinement and input

- The AI generates an initial draft, which a human editor then post-edits and revises in depth.
- Examples: AI-generated text/code is refined and customised by humans; An AI draft for a structuring outline of a work is refined and finalised by students.

If AI-generated output is used solely as inspiration and independent thinking clearly predominates in the subsequent independent elaboration, the inspirational output can be used and does not need to be labelled. However, if AI-generated output is only slightly modified, it must not be used in student or academic-research work because there is a risk of plagiarism or copyright infringement.

4.1.3 AI-assisted refinement of form

- A self-written text/code is rephrased, linguistically refined or summarised by the AI. The AI focuses primarily on form rather than content.
- Examples: Using AI to correct spelling, improve comprehensibility, or shorten a text.

This form of use makes sense if you created the content independently. Exception: Linguistic composition is the learning objective.

Since AI also makes mistakes, this form of refinement must also be cross-checked. Document this use in a list of aids used as indicated in the ULB's [Recommendation for Labelling and Documenting AI-Generated Content] (see also Table 1)

4.1.4 AI gives feedback, your independent revision

- The AI makes suggestions or gives feedback that students can use to improve their own work.
- Examples: AI checks code and identifies errors, which you correct independently. AI makes suggestions on how to improve a line of reasoning or indicates where a text is ambiguous or unclear.

This form of use is very conducive to learning if you created the content independently. This allows you to progress more efficiently, but you must check the AI's suggestions for accuracy.

4.1.5 AI as a source of inspiration

- AI is used to find ideas for questions, topics, hypotheses, (alternative) use cases
- Examples: Suggestions are used to help you to get started with writing, or to find an interesting topic for your Bachelor's thesis.

This form of use can be helpful for working efficiently or overcoming writer's block. However, it is not conducive to developing creativity.

4.1.6 AI-assisted translation

- AI is used to translate texts into other languages. However, it is of no use if you want to learn how to translate yourself!
- Example: Translating a scientific or academic-research article with DeepL or ChatGPT.

Using either of these tools can be very helpful; however, their translations must always be checked and post-edited. Document this use in a list of aids used as indicated in the ULB's Recommendation for Labelling and Documenting AI-Generated Content (see also Table 1).

Do not use either of these tools to learn a new language.

4.1.7 AI for knowledge transfer

- AI helps with explaining or illustrating content without AI users using the AI-generated output in their submissions. AI generates questions on topics and content of events, which are then answered independently.
- Examples: A chatbot explains mathematical concepts or explains a complex theory in simpler language. AI generates new questions based on existing ones for students to practise with.

This form of use can be very helpful in understanding basic technical concepts. A deeper understanding of the subject matter is achieved when using AI for practising and taking mock-tests. However, AI-generated output can be faulty. This form of knowledge acquisition must only be used with great caution when preparing for examination. The more specific the topic, the greater the risk.

5 Good scientific practice and use of AI

TU Darmstadt has a statute on 'Safeguarding good scientific practice – TU Darmstadt,' which also applies to using AI. Therefore, all members of TU Darmstadt must commit to being completely truthful regarding their own contributions and those of third parties (in this case: AI-generated output and contributions from other authors). They must consistently question all findings. They must also allow and encourage critical discourse within the academic and research community.

5.1 Labelling and documenting AI-generated contents clearly in academic, scientific and scholarly works

Scientific and academic rigour means verifiability. Therefore, two different requirements must be met for good scientific practice:

1) It must always be clear which statements originate from the authors themselves and which statements they have taken from others. The sources of third-party statements must be cited in a transparent manner.
2) The sources cited must be verifiable: Does the third-party statement originate from the specified source?

Since AI-generated output is slightly different each time a prompt is repeated, verifiability is not guaranteed. Therefore, if the content must be verifiable because it contains factual information, AI-generated output cannot be used as a source.

If lecturers allow the use of AI tools for text production, they run the risk that sources cannot be verified, that the copyrights of other authors can be infringed, and that the academic quality of the work is therefore compromised.

In certain didactic use cases, however, students are asked to analyse or research AI-generated output. In these cases, AI-generated output must be clearly labelled. The academic evaluation then refers to how AI-generated output is handled.

On the website of the University and State Library, you can find its Recommendation for Labelling and Documenting AI-Generated Content based on common citation styles.

It is also advisable to check AI-generated output for potential plagiarism, especially in the case of written papers or theses (*Prüfungsarbeiten*) and dissertations (doctoral theses) produced without proctoring/monitoring, as it cannot be ruled out that the AI will include protected third-party content without citing the source.

In courses in which AI competencies are aimed for, it can be useful to also document the prompts or AI-generated output in a list of aids used. Another potential form of documentation in a written paper or thesis (*Prüfungsarbeit*), or in academic, scientific and scholarly works (*wissenschaftliche Arbeiten)* is a list of aids used (see Table 1), which is included in an appendix in addition to the bibliography and the statement of independent work. This list documents the AI tools used, their providers, versions, forms of use, and the extent of their use. A table such as the one shown below can be used to this end:

Table 1: Model table for documenting the use of AI tools based on the Recommendation for Labelling and Documenting AI-Generated Content by the University and State Library

Form of use (Such as suggestions for wording, text structuring, phrasing headings)	**Your contribution** (Intellectual investment, such as adapting AI-generated content, adding sources, fact-checking)	**Parts of the work affected**	**AI tools** (Name, version and provider, as necessary)	**Remark** (Such as reference to a prompt or thread of conversation with AI tools)
Translation of text passages	Translation, independently checked	Whole work	DeepL Translator (DeepL SE)	
Generating text options	Extensive post-editing of wording	Chap. 1, p. 3, Section 2	ChatGPT (Open AI)	
ChatGPT was asked about topic *xy*	Generated output was compared with own research of academic, scientific and scholarly sources	Chap. 2, pp. 5-7	ChatGPT (Open AI)	Thread of conversation enclosed/attached
Revision of the introduction: clearer wording	AI-generated modifications used to improve my wording	Chap. 1, pp. 2-3	ChatGPT (Open AI)	
Generating visuals	Fig. 2, p. 7: heavily revised, only visualisation idea by Dream	Fig. 2, p. 7	Dream (WOMBO)	

As a student, please note your lecturers' specific instructions on how to document your work. If in doubt, ask for clarification.

5.2 Documentation of AI-generated output as research data

In the context of theses and dissertations, research data from AI-generated output can be derived. The documentation of research data is a central component of modern academic, scientific, and scholarly work. It plays a significant role in the quality, reproducibility, transparency, comprehensibility and further utilisation of research findings. In these cases, please observe the *Leitlinien zum Umgang mit digitalen Forschungsdaten* – Guidelines on Digital Research Data at TU Darmstadt. The *Allgemeine Bestimmungen der Promotionsordnung* – General Doctoral Regulations (PO/AT) of TU Darmstadt also provide recommendations on how to handle research data.

5.3 Potential attempts to deceive

Students who violate the principles for safeguarding good scientific practice by their improper use of AI will have to reckon with repercussions. Lecturers have the right to prohibit or restrict the use of AI for student work if the use of AI contradicts the learning objectives. This right is based on the 'freedom of teaching' granted in Article 5 Paragraph 3 of the *Grundgesetz* – Basic Law for the Federal Republic of Germany. Lecturers can specify the use of AI in a way that is helpful for their didactic goals. However, it is often difficult or impossible to verify whether the conditions specified have been observed. The theoretical range of possibilities conflicts with the practical limits of verification.

Unauthorised aids must not be used. TU Darmstadt regulates administrative offences and attempts to deceive during examinations in the APB (*Allgemeine Prüfungsbestimmungen* – General Examination Regulations).

The following passages are particularly relevant in this context:

> APB Section 22(7): *"In written papers (schriftliche Arbeiten – such as seminar paper, homework assignment, project work) and theses (Abschlussarbeiten) completed without proctoring/monitoring (ohne Aufsicht), the candidates must identify all sources used, including sources found on the Internet, and any other aids used [...]."*
>
> APB Section 38(2): *"An attempt to deceive will also be deemed to have been made if a false declaration has been made in accordance with Sections 22(7) or if another work, an adaptation of another work, a redesign of another work is reproduced in whole or in part in the written examination, written paper or thesis without this having been cited (plagiarism in accordance with Section 22(7))."*

An attempt to deceive is determined by the examiners or, if applicable, by the relevant examination board (Section 38(1) APB). When establishing an attempt to deceive, the respective examinee must be heard (Section 28 of the *Verwaltungsverfahrensgesetz* – Administrative Procedure Act). The hearing can take place in writing or in oral form. If it is done in oral form, a suspected attempt to deceive can be clarified by summoning the examinees to an interview to clarify if there has been an attempt to deceive. The purpose of this subject-related interview with the examinee is to clarify whether the knowledge demonstrated in the submitted work is actually present. Formally, these interviews are not to be considered as additional examinations. Their sole purpose is to investigate a possible attempt to deceive. Hence, such an interview can only have one of these two outcomes: There has either been an attempt to deceive or not been an attempt to deceive. The next steps are based on the APB (*Allgemeine Prüfungsbestimmungen* – General Examination Regulations) of TU Darmstadt.

6 Information and advisory services

6.1 For students and doctoral candidates on the topic of writing with AI tools

The SchreibCenter at the Language Resource Centre of TU Darmstadt offers ongoing advice and workshops on the topic of writing with AI tools. Lecturers can draw their students' attention to these services, and students can attend them on their own initiative: Workshops on the topic of writing with AI tools.

As part of its Moodle course on study techniques, the Center for Educational Development and Technology (HDA) offers students a module on AI in the learning process.

The University and State Library (ULB) offers learning formats on literature review, copyright and citation as well as recommendations for labelling and documenting AI-generated contents clearly .

6.2 Information on generative AI

In the AI toolbox on the *einfachlehren* information portal for training in higher education of TU Darmstadt, you will find an overview of selected AI tools with information on their features, their possible uses, and an assessment of their respective data protection compliance. The toolbox is intended for lecturers and students who want to use generative AI responsibly and purposefully in higher education.

On the AI Campus webpages, there are various online courses available on artificial intelligence, ranging from basic to advanced topics such as machine learning, AI in medicine and ethical issues. The courses can be completed flexibly in self-study and are useful for both lecturers and students.

In addition, the AI Campus Prompt Lab provides an interactive platform where users can broaden their AI competencies by trying out AI tools and creating their own AI prompts.

Part 2: For lecturers

7 Designing teaching formats

AI can be used in many different ways that are more or less effective for learning (Buck & Limburg, 2024). At the left end of the scale (see Figure 2), people’s work and learning are undermined. At the right end of the scale, however, human-machine interaction encourages and broadens thinking, thereby improving the quality of the resulting outcomes.

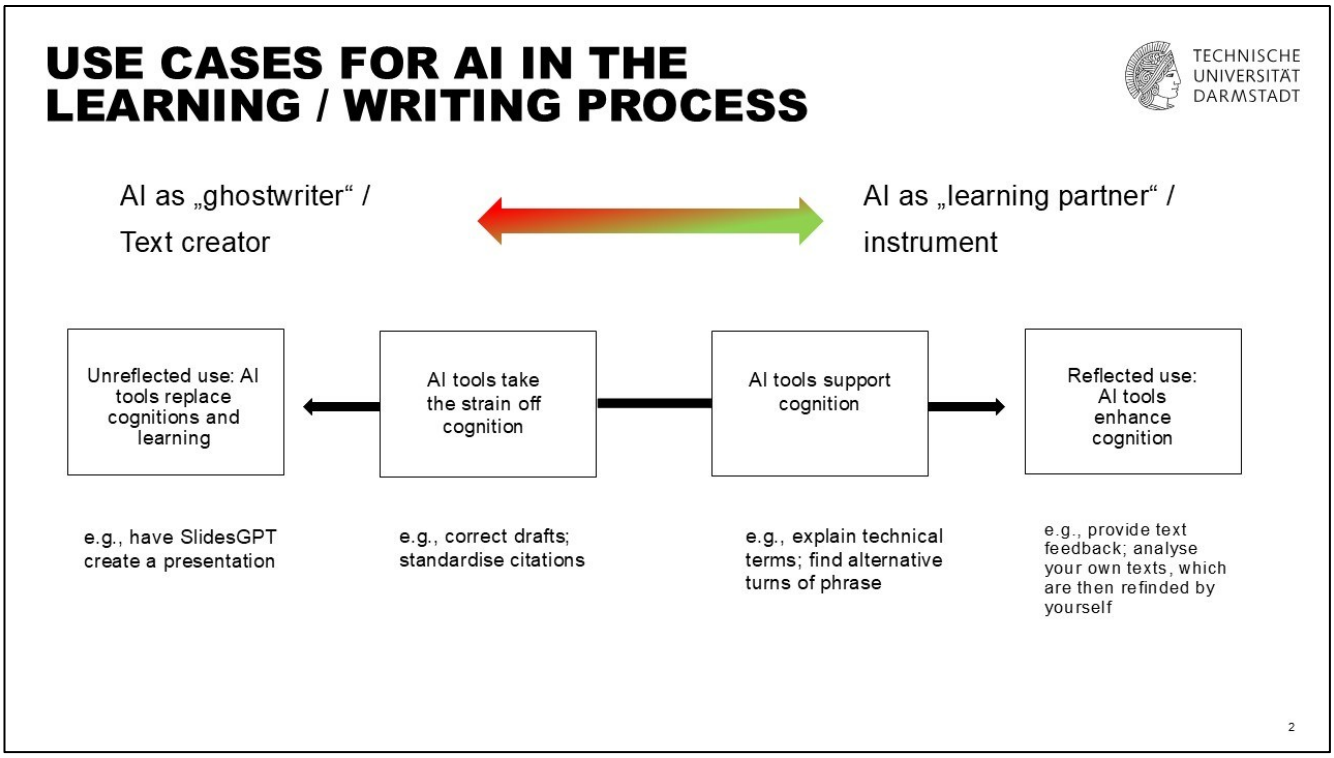

Figure 1: Use cases for AI in the writing process (according to Buck & Limburg, 2024)

The aim of good teaching in the field of AI is to discourage the indiscriminate use of AI tools, while encouraging a progressively widening approach.

This is the only way for students to acquire the competencies they need for their future careers. It is important that lecturers demonstrate the limitations of AI using real-world examples. This way, students can learn that AI-generated output often fails to meet technical standards. At the same time, lecturers are asked to use assignments and exercises to instruct students in using AI in a way that broadens their own thinking. For instance, students can use prompts and AI-generated output to critically examine or improve their own work.

7.1 Encourage, allow, or disallow – depending on the learning objective

Students must be given the opportunity to become competent AI users during their studies. Accordingly, lecturers are asked to offer learning opportunities to do so. At the same time, lecturers must ensure that students acquire the required specialist skills. They must also ensure that learning is not impaired by the indiscriminate use of AI.

Two things are important to prevent students from using AI tools simply to avoid independent learning:

1) Lecturers must systematically instruct students in how to use AI-generated output appropriately in a critical and reflected manner. It can also help to show students how to collaborate with AI in an effective and sensible manner.
2) Lecturers can foster a reflected and actively engaged collaboration with AI by actively overseeing students' written homework assignments, final papers and theses (*Abschlussarbeiten*), and giving them immediate feedback (including on preliminary versions).

Oral interaction and oral examination have a proactive effect on written examinations that are not proctored/monitored. This requires students to access information stored in their long-term memory spontaneously while discussing their findings and methods used. Only through intensive independent study of the subject matter can they commit this information to memory.

> However, please note the information on higher education law in Section 5 'Good scientific practice and use of AI' when combining a written and an oral examination.

Ask the students about their existing knowledge: which AI tools do they use and for what purposes? With the competencies aimed for in the course and the findings of Buck & Limburg (see Figure 2) in mind, discuss which use cases for AI tools make sense and which do not.

7.2 Working without AI tools: Basic competencies

Although students will work extensively with AI in the future, there are teaching use cases in which it is best to restrict the use of AI at first:

7.2.1 Basic specialist knowledge

The aim is to impart basic specialist knowledge that can later be retrieved spontaneously from long-term memory in professional life; knowledge that is necessary for evaluating AI-generated output.

For this use case, written or oral forms of examination are provided for, in which students have to retrieve specialist knowledge and understanding without AI tools.

A major risk in this use case is that students use AI tools for exercises during the semester and then fail the examination without them. Students must be made aware of this risk on a regular basis. Hence, supervised practice group sessions must be conducted during which the use of AI tools is not permitted. Lecturers are asked to regularly explain the didactic reasons why their students need to master this basic specialist knowledge without the use of AI. Employers are only interested in employees who can professionally evaluate AI-generated output. Those who leave learning to AI while in training are at the mercy of AI-generated output. Anyone who cannot evaluate AI-generated output independently is of no interest to the labour market.

7.2.2 The core ability to think creatively and innovatively

It is important to encourage creative and innovative thinking in order to develop solutions for new problems even without the help of AI. For students to learn innovative and creative thinking, some courses might restrict the use of AI. These courses would ideally take place in face-to-face settings.

7.2.3 Basic writing skills

Acquiring basic writing skills is essential. In order to communicate their thought processes in a structured manner, students must learn to write academic texts independently. Academic and scientific writing is an essential skill. It builds on existing research, enables writers to engage in academic and scientific dialogue by contributing their own thoughts and findings. Students will only be able to evaluate AI-generated texts after they have acquired the necessary basic writing skills. Once this has been accomplished, collaborative interaction with AI can be practised.

Lecturers can foster basic writing skills either in face-to-face courses or in closely supervised writing homework that excludes the use of AI. However, this will only work if there are enough people available to assist the students.

7.2.4 Alternatives to an AI ban

As it is difficult to prove unauthorised use of AI, lecturers have the following options:

- They can trust their students.
- They can clearly identify important learning objectives and highlight potential issues associated with failing to acquire the necessary skills in a timely manner. In addition, they can explain to students why temporary restrictions on using AI are important for their learning process and future professional competence.
- In face-to-face settings where good standards have been set, they can rely on the effect of social contagion among students ("We want to learn this without using AI tools"). Face-to-face tutorials and writing groups for practising together are also a good option to this end.
- They can check whether students have acquired the necessary basic skills in proctored/monitored (examination) settings.
- They can foster the acquisition of competencies by asking students to hand in preliminary versions of their work and providing (peer) feedback, provided that sufficient teaching capacity is available.
- Examinations that are not proctored/monitored: In the event of suspected unauthorised use, the regulations on suspected attempts to deceive apply (see 5.3 'Potential attempts to deceive').

7.3 Using and reflecting on AI tools effectively and purposefully: AI competencies

If the aim is to learn how to use AI tools competently, it makes sense to use selected AI tools during class time or as homework assignments and compare the AI-generated output with that obtained using conventional methods. Analysing the strengths and weaknesses of each method can highlight both the benefits and risks of AI. Ethical aspects, such as undesirable discrimination through bias of AI, energy requirements of AI or data protection issues also need to be discussed with the students, unless these aspects have already been covered in a previous course.

In this context, lecturers must note that students might have to give their consent for data protection reasons if AI tools are to be used (see Section 7.6.2 'Consent from students to use AI'). This is why it is not always possible to use AI tools in compulsory courses. Paid accounts and appropriate privacy settings are required wherever possible to prevent providers of AI tools from reusing data for their own purposes. In the interests of equal opportunities, the costs of accounts for students must be covered if necessary. TU Darmstadt is working on providing free and secure access to AI for students.

An important step in acquiring AI competencies is learning how to prompt AI efficiently to ensure high-quality output. Practising prompts and using prompt libraries need to be included in dedicated courses.

If AI competencies are part of the learning objectives, proctored/monitored examinations must be adapted accordingly. AI tools can be used when taking e-examinations. For more information, please contact the E-learning unit of the Center for Educational Development and Technology (HDA).

For student work that is not proctored/monitored, students need to be regularly informed of the academic requirements for independent work and academic integrity (see Section 5 "Good scientific practice and use of AI") and encouraged to comply.

Thus prepared, students will be able to work independently on assignments that involve using AI tools along with other methods. They will also be able to document their work (see Section 5.1 'Labelling and documenting AI-generated contents clearly in academic, scientific and scholarly works') and reflect on the methods and tools used. It is advisable to disclose certain features of AI tools that are permitted for use and to exclude other features, while stating the reasons for doing so. If lecturers want to recommend specific AI tools, a positive list that students are allowed to use is preferable to a negative list, as it might not be possible to exclude all relevant tools.

7.4 Fostering good scientific practice

The use of generative AI for studying can jeopardise students' learning processes if students stop thinking and making decisions independently. This can result in them incorrectly passing off AI-generated output as their own work, unreflected and unchecked against scientific sources. However, it is not only learning that is suffering. The lack of academic integrity is also a serious issue.

Plagiarism software and so-called AI detectors have so far proven to be ineffective in detecting unauthorised use of AI. These detectors cannot provide any evidence for the assessments made because they only calculate percentage assessments based on learned patterns. Hence, the findings of these detectors can neither be relied on nor retraced in a transparent and comprehensible manner (see this video on the *einfachlehren* information portal for training in higher education). In addition, detectors are always limited to a certain number of generators, and usually also to very specific versions. Enhancements to the generators and new releases cannot be detected by the detectors, which means that even the best software quickly becomes obsolete.

Hence, the aim is to foster academic integrity (see Section 5 'Good scientific practice and use of AI') in order to ensure that students acquire the necessary competencies and comply with academic standards. This requires transparent communication with students on this topic. Providing examples and explaining the reasons behind the rules help students to understand the nature of the problem. Violations must be punished consistently (see Section 5.3 'Potential attempts to deceive').

7.5 Didactic planning for the use of AI in teaching

At degree programme level, the integration of AI into teaching requires careful planning of modules. However, changes must also be made at short notice within the framework of existing modules, forms of examination and degree programmes. Unnecessary duplication of AI topics needs to be avoided in consultation with colleagues.

- At course level, you can as lecturers create an innovative learning environment by taking into account students' previous experience, a collaborative learning approach and the development of specific skills and competencies.
- Think about which specific AI competencies are relevant to your field of expertise (such as data analysis, ethical aspects, real-world applications).

- Ask the students about their existing knowledge: which AI tools do they already use and for what purposes? With the competencies aimed for in the course and the findings of Buck & Limburg (see Section 7 'Designing teaching formats') in mind, discuss which use cases for AI tools make sense and which do not.
- Develop suitable methods and materials to impart these competences. Incorporate interactive teaching and learning formats into your teaching.
- When using AI tools, check whether this is will require additional time and effort for students. If this is the case, you need to take steps to ensure that the workload for students does not get too heavy. Consider which existing teaching content can be deleted or adapted in favour of new AI competencies.
- Be prepared to make ongoing adjustments to your teaching and examination design based on student feedback and your own observations.
- Reflect critically on AI output with your students. Also show your students where AI reaches its limits.
- Discuss ethical issues associated with AI (see Chapter 2.), ideally by means of case studies that make the topics tangible.

7.6 Legal information: Equal opportunities and consent

The next sections explain the most important requirements and give advice for putting them into practice in a way that is fair and follows data protection rules.

7.6.1 Equal opportunity

Equal opportunities for students are violated if lecturers require them to use AI tools that are subject to a fee.

7.6.2 Consent from students to use AI

If AI tools are to be used in courses, students will often have to provide their personal data when registering and for later login. Students must be able to do this by choice. Registration is voluntary if it is not mandatory as part of compulsory courses. Registration is also voluntary as part of elective courses, provided that there are sufficient elective modules to choose from, which do not require the use of AI tools. In elective courses, it must be clearly stated in the module description that AI will be used. Hence, only those students who give their consent to using AI in the course should choose the respective module.

Data protection law requires a legal basis for processing personal data such as first name, last name, email address or mobile phone number. Voluntary consent is a common legal basis. In the case of compulsory use in a compulsory event, this voluntary nature is excluded.

As an alternative, lecturers can select AI tools that do not require personal data for registration, or can allow students to register using a disposable email address and fictitious name (provided the AI tool does not require a mobile phone number). Furthermore, it is possible to organise the course in such a way that students work together on devices, giving those students who do not wish to register the opportunity to follow the content.

8 Using AI tools in teaching

AI tools can also be used by lecturers to prepare lessons or to provide feedback to students. Examples of how lecturers can use AI to prepare their course contents efficiently include collecting materials, creating lesson plans using didactic methods, preparing slides, subtitling videos and suggesting quiz and exam questions. However, AI must remain one of several sources, and professional review of AI output is essential.

8.1 AI tools for getting ready to teach

The *einfachlehren* information portal for training in higher education at TU Darmstadt provides articles and media that are updated regularly and can be used to prepare lessons. You will find both an AI toolbox and articles on teaching with artificial intelligence.

8.2 Prompt catalogues and model use cases for preparing lectures/courses

The *einfachlehren* information portal for training in higher education provides regularly updated prompt templates for teaching purposes that will lead to higher-quality outputs. They can be used to prepare courses efficiently and creatively. The didactic guidelines on best practices when using AI in teaching offers many options on how to integrate AI into higher education based on use cases.

8.3 Intelligent tutoring systems and proprietary GPTs

Self-trained GPTs or so-called intelligent tutoring systems are one possible use of AI to assist students in their learning. These systems provide personalised answers to subject-related questions, as well as assistance, interactive exercises and feedback. They are linked to the relevant course materials, complementing the lectures and exercises. As the effort involved is considerable, these systems are best used in large, repetitive lectures. (Bear in mind that even trained GPTs cannot replace real tutorials, because only in face-to-face tutorials uncertainties can be discussed on an equal footing in a protected space. Tutors also act as role models, showing students their own paths to academic and professional socialisation.

The Center for Educational Development and Technology (HDA) provides assistance when developing an intelligent tutoring system.

9 Designing examination formats

In principle, lecturers and examiners are entitled to set their own requirements for the use of AI in each course or examination that they supervise, provided these requirements do not conflict with any other regulations, such as:

1) The APB (*Allgemeine Prüfungsbestimmungen* – General Examination Regulations) of TU Darmstadt or
2) The implementation regulations for a degree programme of the department / field of study and
3) The module descriptions of the courses.

Lecturers must inform students of these requirements for the use of AI at the beginning of the semester, or at the latest when they register for examination. However, lecturers need to bear in mind that too many differing requirements in different courses and degree programmes can greatly confuse students.

9.1 Changing the assignment types

There is currently much debate about whether changing the assignment types can curb students' indiscriminate use of AI to boost rather than stifle their learning experience. With the rapid development of AI technology and clever prompting, AI has already become capable of handling many assignment types. Still, there are other ways to make sure that students learn the specialist knowledge and skills needed.

These include practical assignments, activities that require spontaneous oral contributions, and supervised exercises.

New assignment types that train the use of AI tools will also be used in future courses.

9.2 New forms of examination

New forms of examination are also required:

1) To check AI competencies: Some examinations must be expanded to include AI in order to test relevant learning objectives. In these cases, e-examinations must be expanded to include AI tools.
2) The aim of such examination questions can also be to assess AI-generated outputs and explain why a different answer might be better.
3) Proctored/monitored examinations remain relevant to prevent the unauthorised use of AI, particularly when fundamental specialist knowledge and professional competencies and skills are to be acquired.
4) Oral examinations will become more important to ensure that students have acquired the necessary competencies and skills. An oral 'defence' of written papers (such as seminar papers, homework assignment, project work and theses), in which students must respond spontaneously to questions about their work, enables lecturers to recognise how thoroughly students have explored their respective topics. Knowing about the oral defence requirement can also help to prevent students from using AI indiscriminately.

Note on higher education law

The form of examination and the number of examinations to be introduced is limited. It is only feasible to combine two examination events within one module (i.e., an unsupervised written examination and a supplementary oral examination) if the examination workload for students (studiability) in the relevant semester remains reasonable. For final modules (theses) worth more than 10 CPs, two examinations can be reasonable: one unproctored written examination and one oral examination.

Permissible changes must be stated in the Degree Programme Regulations, in the implementation regulation specifying the APB, in the study and examination plan (SPP), or in the module handbook. These changes must be coordinated with the *Referat Hochschulrecht* (Higher Education Law) and the *Sachgebiet Studiengangsentwicklung* (Degree Programme Development) and decided by the relevant (governing) bodies. Changes are only possible for future cohorts of students. The examination conditions must be finalised before a module or course is offered.

9.3 Changing the assessment schemes in terms of weighting

The assessment schemes of various institutes/lecturers for Bachelor's/Master's theses, and possibly also for coursework and project work, must be reviewed in terms of their weighting: Finding information will become easier in the future. The student's ability to look at AI-generated output critically, to check and supplement information carefully based on other sources will be important assessment criteria. Spelling, grammar, language style and translation are likely to become less relevant as students become competent in using AI tools to check these criteria themselves. By and large, the written part could be weighted lower in relation to the oral part.

9.4 Theses (*Abschlussarbeiten*)

By the time they are working on their Master's thesis, students should be able to use and document AI tools competently and responsibly. It should be just as natural to them to check AI-generated output using academic, scientific and scholarly sources as it is to do AI-assisted bibliographic research or on electronic portals, or to have AI improve or correct their texts linguistically. If the examination regulations permit, an oral defence of the thesis is a useful way to check whether the work has been completed fairly independently, and to assess the students' ability to present their own thoughts and reasoning orally.

9.5 Responding to unauthorised or suspected use of AI from the perspective of academic integrity

Lecturers have reason to suspect that AI has been used inappropriately in a student's work if the authorship of statements is not clearly indicated or the origin of a statement cannot be verified (see Section 5 'Good scientific practice and use of AI'). The APB (*Allgemeine Prüfungsbestimmungen* – General Examination Regulations) of TU Darmstadt stipulate the legal framework for reviewing such cases of suspected use of AI. The specific steps are described in Section 5.3 'Potential attempts to deceive'.

9.6 Assessing submissions and learning achievements using AI

When using AI as lecturers, we could also think about using it to assess students' solutions to exercises, homework assignments and theses. But Data protection law and examination law have a restrictive effect in this context. The exclusive use of automated assessment methods is not permitted by law if the results of the assessment can adversely affect people. Hence, examiners are not permitted to assess submissions or written exminations etc. using AI only. It is possible for an AI to pre-check a submission or written examinations and make a suggestion, provided that the lecturer makes the final assessment. "However, this responsibility lies with the lecturers, who must assess the examination performance based on their own judgement. Arriving at the required independent decision is only possible if the examiners have taken direct and full notice of the examinee's performance themselves and evaluated it independently from their own perspective" (unofficial translation) (Fischer, Jeremias, Dietrich, Prüfungsrecht, 8th edition 2022, margin number 320).

In practical terms, this means that AI assistance does not promise any real efficiency gains for lecturers and can at best be used to provide suggestions for achieving higher quality results in grading or feedback.

It is strongly discouraged to have AI generate the assessment or expert opinions for theses (*Abschlussarbeiten*). The only way to ensure the long-term trust of your students is through carefully reading and assessing their work. Please also bear in mind that merely uploading student work can constitute a copyright infringement if the AI provider reuses prompt data. There are also ethical concerns, as the assessment decisions of AI systems are currently not transparent; hence, they are difficult to explain and understand.

10 Model learning objectives for AI competencies

Students must acquire comprehensive AI competencies during their studies. However: Students must also learn specialist knowledge using traditional methods, because they will be at the mercy of AI-generated output without this knowledge. Knowledge has to be acquired first to retrieve it spontaneously. This will not be possible when relying solely on AI. Independent learning and the effort that goes with it are still necessary.

Lecturers will integrate AI-related learning objectives into their courses and modules. The following provides some examples of how these competencies can be described.

In addition to the technical competencies, the following generic AI competencies are aimed for. For example, students can...

- ... Explain the basic functioning of generative AI tools and can assess the possibilities and limitations of such tools. (This also includes the non-deterministic nature of AI [i.e., the same input does not always generate the same output], hallucinations, no formal logic and other issues);
- ... Write effective prompts for the AI tools used in their courses to get high-quality results;
- ... Use generative AI tools – based on basic academic writing skills – as a writing assistant for their academic text production. These tools can assist them in gathering ideas, honing their line of reasoning, and revising their writing style. This includes the ability to compare text generated by AI tools with academic, scientific and scholarly sources, the ability to critically reflect on it, and to revise and integrate it into their own text;
- ... Apply the necessary citation and documentation requirements as defined by the rules of good scientific practice, especially when using AI tools;
- ... Explain ethical and legal aspects of AI development and use. The students can also incorporate them responsibly into their decision-making process about using AI or not.
- ... **Subject-related AI competencies need to be added as well.**

11 Information and further training programmes for lecturers specifically

Various information and support services are available for lecturers who would like to explore the use of artificial intelligence in higher education.

11.1 Training programmes and resources at TU Darmstadt

- If you have any questions about using AI in study and teaching, please contact: ai-literacy@hda.tu-darmstadt.de
- In its programme, the University Teaching and Learning Development unit of the Center for Educational Development and Technology (HDA) provides advice and runs workshops on AI in teaching.
- The *einfachlehren* information portal for training in higher education at TU Darmstadt compiles articles and videos on the topic of artificial intelligence in teaching.

11.2 Additional programmes and resources

- On the *Hochschulforum Digitalisierung* (higher education forum on digitalisation) in the field of 'Generative AI', you can find numerous interesting blog posts and self-study courses on the topic of AI and higher education.
- The AI Campus of the *Stifterverband* offers a wide range of material and learning opportunities.
- The *Gesellschaft für Medien in der Wissenschaft* and the *Deutsche Gesellschaft für Hochschuldidaktik* have published a Handreichung zur praktischen Nutzung von KI in der Lehre (10/2024) (didactic guidelines on best practices when using AI in higher education).

Part 3: Appendix

12 Sources

Buck, I., Limburg, A. (2024). KI und Kognition im Schreibprozess: Prototypen und Implikationen. JoSch– Journal für Schreibwissenschaft, 15(26), 8-23.

Fischer, E., Jeremias, C., & Dieterich, P. (2022). Prüfungsrecht, 8., vollständig überarbeitete Auflage.

Perkins, M., Furze, L., Roe, J., & MacVaugh, J. (2024). The Artificial Intelligence Assessment Scale (AIAS): A framework for ethical integration of generative AI in educational assessment. Journal of University Teaching and Learning Practice, 21(06).

13 Legal texts

General Data Protection Regulation (GDPR, version of 27 April 2016): http://data.europa.eu/eli/reg/2016/679/oj. [18 November 2024].

European Artificial Intelligence Act (AI Act, version dated 13 June 2024): http://data.europa.eu/eli/reg/2024/1689/oj. [18 November 2024].

Urheberrechtsgesetz (UrhG – Act on Copyright and Related Rights, version dated 26 June 2023): https://www.gesetze-im-internet.de/englisch_urhg/index.html. [18 November 2024].