

Term 3: September 2027 – January 2028

FAU Erlangen-Nürnberg

CORE MODULES (22.5 ECTS)

- Professional project at an associated partner (5 ECTS)
- Applications of machine learning (10 ECTS)
- Multimodal corpus linguistics (5 ECTS)
- Professional impact II (2.5 ECTS)

Professional project at an associated partner (5 ECTS)

In their professional project at an associated partner (universities, industry, public administration, non-profit organizations), students apply their knowledge and skills in a professional setting. Typical duration: 6 weeks full-time.

Applications of machine learning (10 ECTS)

This module provides a hands-on introduction to the application of machine learning in multimodal communication research. Students will explore key areas including Natural Language Processing, speech processing, computer vision, and their combinations. The module emphasizes practical experience, with projects tailored to individual programming skills and research interests. Students may engage with high-level applications or implement low-level technical solutions, gaining both conceptual understanding and practical expertise in applying machine learning techniques to real-world multimodal data.

Advanced seminar (Hauptseminar): In this seminar, students will gain practical experience in applying machine learning to multimodal communication research. They will learn to use off-the-shelf machine learning tools as well as develop their own custom pipelines. Students will design and carry out their own projects, demonstrating skills in building and annotating multimodal corpora from scratch. The seminar emphasizes hands-on learning, enabling students to integrate theory and practice while developing expertise in managing and analyzing complex multimodal data.

Practice seminar (Übungsseminar): In this practice seminar, students will learn to work with large-scale datasets using high-performance computing (HPC) resources. They will gain hands-on experience in scheduling jobs, monitoring performance, and optimizing computational workflows (e.g., parallel computing). Additionally, students will explore best practices for data management, reproducibility, and

efficient resource utilization, preparing them to handle complex machine learning tasks on large multimodal datasets covered in the advanced seminar.

Multimodal corpus linguistics (5 ECTS)

This module focuses on the design, creation, and use of multimodal corpus resources. Students will learn how to combine various data streams, including the output gathered from the various machine learning applications presented in the *Applications of machine learning* module.

Seminar: In this seminar, students will learn about language corpora, starting with pure text corpora, moving on to spoken and multimodal corpora. Students will learn how to collect their own multimodal corpora, how to structure metadata and annotation using various file formats, and how to exploit such corpora for linguistic research.

Professional impact II (2.5 ECTS)

Advanced communication skills, organizing and writing the master's thesis, peer-review and publication, speaking to multidisciplinary audiences, visual and oral (or multisensory) presentation of data, advanced project writing and management, job applications and interviews, grant/fellowship writing, business and academic CV writing and presentation. Additionally, individualized networking strategies as well as team work to finalize the organization of the MULTICOM conference.

ELECTIVE COURSES (7.5 ECTS)

- Management and business (5 ECTS)
- Trends in multimodal data science UMU (2.5 ECTS)
- Trends in multimodal data science FAU (2.5 ECTS)
- Work project in multimodal data science (2.5 ECTS)
- Multimodal computer science (5 ECTS)
- Free-choice course at FAU, outside the MULTICOM offer (5 ECTS max.)

Management and business (5 ECTS)

Crash course on managerial skills: team building, personal communication, social entrepreneurship, industry-specialized conferences, financial reporting and analysis, economic environment and country economic analysis, management accounting, leadership of people and change, strategic marketing, negotiation, creativity and ideation, influence and persuasion, government and sustainability, entrepreneurial venturing including start-up and spin-off development, creating value, digital transformation, leadership and uncertainty, or career planning with a management and business-administration component.

Trends in multimodal data science UMU (2.5 ECTS)

Online. University of Murcia Faculty. This course will introduce current trends and emerging approaches in multimodal data science. The aim is to familiarize students with recent developments in methods, tools, and applications, and to provide a framework for critically evaluating new research. The specific area of study that will be covered in the course will change according to the availability of the invited teaching staff and their expertise. Topics include (but are not limited to) the study of pioneering advanced data collection techniques (e.g., multimodal sensors, motion caption devices, virtual reality), innovative data analysis methods (e.g., machine learning for multimodal data, automated annotation), application of multimodal research in education (e.g. multimodality in developmental psychology). The course will combine theoretical discussions of emerging trends with practical examples and case studies, enabling students to apply these approaches to real-world multimodal datasets. This course is offered in terms 1 and 3, which allows both first- and second-year students to take it. It is not required to have attended any of the other courses in Trends in multimodal data science.

Trends in multimodal data science FAU (2.5 ECTS)

This course will introduce current trends and emerging approaches in multimodal data science. The aim is to familiarize students with recent developments in methods, tools, and applications, and to provide a framework for critically evaluating new research. The specific area of study that will be covered in the course will change according to the availability of the invited teaching staff and their expertise. Topics include (but are not limited to) the study of pioneering advanced data collection techniques (e.g., multimodal sensors, motion caption devices, virtual reality), innovative data analysis methods (e.g., machine learning for multimodal data, automated annotation), application of multimodal research in education (e.g. multimodality in developmental psychology). The course will combine theoretical discussions of emerging trends with practical examples and case studies, enabling students to apply these approaches to real-world multimodal datasets. This course is offered in terms 1 and 3, which allows both first- and second-year students to take it. It is not required to have attended any of the other courses in Trends in multimodal data science.

Work project in multimodal data science (2.5 ECTS)

Individual professional project at a non-academic partner, co-supervised by a faculty member from LU/FAU/UMU and a tutor at the partner. Flexibility in content and schedule, upon approval of the graduate advisor and governing board.

Possibilities:

- i. Follow-up from the professional project.
- ii. A small project in anticipation of a further placement in term 4.

- iii. An exploratory application of the student's skills to a non-academic organization.
- iv. An open-ended collaboration in research in technology development, in UX or CX, or any other relevant field.

Multimodal computer science (5 ECTS)

This module allows students to take relevant courses from Computer Science. E.g.,

- i. Machine Learning for Engineers I (Eskofier)
- ii. Introduction to Machine Learning (Christlein)
- iii. Deep Learning (Maier)

Other modules or courses from Computer Science, Data Science, Digital Humanities and Computational Linguistics might be imported if approved by the module coordinator.

Free-choice course at FAU, outside the MULTICOM offer (5 ECTS max.)

Students are expected to obtain all necessary credits from the master's own offer. However, individual demands for courses locally offered at FAU will be considered on a case-by-case basis. Such courses should be of clear theoretical or methodological relevance, and well integrated into the student's degree and career plans. They will not be language courses. All students will be encouraged to take an extra course in German as a foreign language from FAU Language Services, as an extracurricular activity, not for credit, with tuition covered for MULTICOM-funded students.