Term 2: January-June 2027
Lund University

CORE MODULES (20 ECTS)

- Lab methods in multimodal data science (7.5 ECTS)
- Language and multimodality (5 ECTS)
- Ethics, data management, intellectual property (2.5 ECTS)
- One of the following modules (5 ECTS):
  Introduction to programming in Python **OR** Advanced statistics and computing

Lab methods in multimodal data science (7.5 ECTS)

This course builds on and expands the course *Human multimodal communication* in semester 1 and offers a general introduction to a range of lab-based methods for the study of multimodal communication. It introduces an introduction to novel approaches to audiovisual recordings (e.g. 360-cameras) and to sensor-based technology such as eye-tracking, motion capture, articulography and biopac recordings. Students will be introduced to the theoretical foundations of each technique alternating with hands-on experience with the tools in smaller groups. The aim of the course is to familiarize students with theoretical and practical aspects of lab approaches for the study of human multimodal communication. It will provide them with basic practical skills in recording data from sensor equipment, and introduce them to software needed for the analysis of the recorded data. The course will provide formal descriptions and basic guidelines for the use of different tools together and exemplify their application in practical cases.

Language and multimodality (5 ECTS)

This course specializes on the tight relationship between multimodality and language use, whether spoken or signed. It introduces and discusses multimodality in relation to different linguistic levels (e.g., prosody, semantics, syntax, etc.), effects of crosslinguistic variation, (child and adult) language acquisition and bilingualism. It also discusses the relationship between gestures and sign language. The course will mainly take the form of an active seminar based on reading assignments, with oral presentations and direct interaction between students and faculty.

Ethics, data management, intellectual property (2.5 ECTS)

This course introduces and discusses the complexities of working on multimodal data (sound, video, revealing individuals), and the particular challenges related to what to do and not to do with such. The course discusses research ethics (e.g., what is required by law vs. what is morally just), challenges of

data management (e.g., storage on secure servers to shield individuals' identity and integrity vs. cloud storage), and the tension between issues of intellectual property and the move towards Open science and Open data. The course takes the shape of an active seminar based on readings and concrete examples, and direct interaction between students and faculty.

Introduction to programming in Python (5 ECTS)

The course gives an introduction to Python programming as a tool to study human behavior. It consists of lectures and practical exercises. The course gives an introduction to basic concepts in Python. (e.g. Numpy arrays, defining functions, basic graphics and plotting, stimulus preparation, etc.). It also provides practical training and students will be asked to define and solve a problem of their own using Python. No previous knowledge of Python is assumed.

Advanced statistics and computing (5 ECTS)

This course will introduce students to the principles and practices of statistical analysis through a combination of lectures and practical exercises. The aim is to develop the skills needed to prepare, analyze, and report data in a clear and scientific manner. Students will learn to apply the necessary modifications to datasets, to select and calculate suitable descriptive statistics, and to choose statistical models that either provide an adequate fit or address the research questions under investigation. They will also acquire the ability to follow up initial models with additional analyses when required and to present their findings in a precise and well-structured style.

ELECTIVE COURSES (10 ECTS)

- Trends in multimodal data science LU (5 ECTS)
- Artificial cognitive systems and multimodality (5 ECTS)
- Lab project in multimodality (5 ECTS)

Trends in multimodal data science LU (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 advanced data collection techniques (e.g., multimodal sensors, motion capture devices, virtual reality), new data analyses (e.g., combination of data streams such as eye-tracking and motion capture). The course will combine theoretical discussions of emerging

trends with practical examples and case studies. It is not required to have attended any of the other courses in Trends in multimodal data science.

Artificial cognitive systems and multimodality (5 ECTS)

This course will introduce current approaches to artificial cognitive systems and social robotics, focusing especially on approaches to making robots reproduce or respond to human multimodal behaviour (e.g. gaze direction for goal-directed action, emotional responses such as pupil dilation, gesture recognition and synthesis). The course will introduce theoretical and practical issues through seminar style lectures as well as practical experience with individual cases.

Lab project in multimodality (5 ECTS)

This course is intended to develop deeper knowledge and expertise concerning a lab-based approach to multimodality. The aim is to give student expanded insights into and practical knowledge of the steps in a multimodal project using specific equipment ranging from planning, data collection, data treatment and curation, visualization, and analysis, and to train them in critically evaluating new research. The specific area of study and tools used in the course will change according to the availability of technology, invited teaching staff and their expertise. Students will work on developing a concrete project of their own.

Free-choice course at Lund University, 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 Lund University 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 Swedish as a foreign language from Lund University Language Services, as an extracurricular activity, not for credit, with tuition covered for MULTICOM-funded students.