

Study Guide

for the

Master's Program

Communications and Multimedia Engineering

Academic Year 2024/25

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Preface

This document is written to support the students of Communications and Multimedia Engineering (CME) at FAU in organizing their studies and to provide some insight into this program to prospective students and the generally interested public. As such, it describes the main characteristics of the program, its scope, and its goals. As reference information, it includes an English description of the curriculum and the key elements of the applicable examination regulations for CME students. The latter are based on the German-language program-specific examination regulation for the Master's program Communications and Multimedia Engineering (CME) and the German-language general examination regulation of the Faculty of Engineering at the Friedrich-Alexander University Erlangen-Nürnberg (FAU). **Please note that the German versions of the [examination regulations](#) are the legally binding documents.** The study guide also includes relevant guidelines for using the services provided by the university and its associated institutions, e.g., the housing service of the accommodation support, an overview of need-to-know internet platforms and useful addresses. The authors hope that it is found useful and welcome feedback and suggestions for additions.

Erlangen, October 2024

Vivien Aehlig, Wolfgang Gerstacker and Heinrich Löllmann

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Chapter 1

CME - The Master's Program

1.1 Overview

The CME Master's study program is based on bachelor and diploma programs with focus on information and communication technology and leads the students to a M.Sc. degree which should allow them to work in cutting-edge research and development in the core areas of communications and multimedia technology and related interdisciplinary topics. The program structure complies with internationally recognized Master's programs and meets the requirements for subsequent doctoral studies. The four-semester curriculum starts in winter and includes a six-month thesis project. All courses are taught in English and do not require prior knowledge of the German language.

1.2 Characteristics and scope of CME

CME is designed for bachelors from Electrical Engineering, Communication Engineering, Computer Science or Applied Mathematics and emphasizes the fundamental concepts of advanced communications and multimedia. The main contributors to the curriculum are the Chair for Multimedia Communications and Signal Processing and the Institute for Digital Communications, respectively. Based on a profound and broad working knowledge in these key areas, the students are also encouraged to pursue their personal interests in areas like audio, electronics, optical communication systems or medical image and video processing. Thereby, the curriculum paves the way to research and advanced development in world-class academic institutions and industry for audio, multimedia, and communications and many other areas where these qualifications are in high demand. At the same time the program stipulates intensive language courses in German to open the door to a career in German-speaking environments.

1.3 Key reasons for choosing CME

Students who strive for insight into the underlying principles of current communication and multimedia technologies will find a stimulating environment when entering CME and will be enabled to apply solid theory to achieve practically relevant solutions. The **high-profile research-oriented faculty** entertains strong links to local and international **high-tech industry** and helps the students to connect to big players in audio, medical systems, and mobile and optical communications. For local students, the international environment offers an easy way to interact with foreign students and to perfect their English language competences. At the same time, international students will find it easy to familiarize themselves with the local culture in Erlangen.

For a personal view on the experiences and opportunities within the CME program, take a look at the [testimonials by CME students](#).

1.4 The curriculum

The curriculum is a well-balanced mixture of modules in the areas of signal processing, information theory, communications, and video and audio processing. Compulsory courses such as Digital Signal Processing, Information Theory and Coding, or Mobile Communications are complemented by technical and nontechnical electives, a seminar, lab courses, a research internship, and the Master's thesis. The predominant theme in the curriculum is to provide the students with **a strong theoretical and methodical background as a toolset of permanent value** for solving relevant practical, hitherto unsolved problems. The program is designed to be finished within 2 years (4 semesters) by full-time students or within 4 years (8 semesters) by part-time students.

The part-time program is designed to meet the needs of students with off-campus employment (flexible working hours required) or responsibilities as a caregiver.

Note: Students who need a visa to study in Germany might not be allowed to enroll in part-time studies due to visa regulations. In these cases, it is obligatory to clarify the situation beforehand with the responsible authorities.

1.5 Goals of the program

The CME Master's program leads the students to cutting-edge research and development in the core areas of communications and multimedia technology and related interdisciplinary topics. After completion of the CME program, it is expected that the students will be qualified for challenging research and development tasks in these areas in industry. Top students should be qualified to pursue a Ph.D. degree after completion of the M.Sc. program in CME.

1.6 History

CME was established in 2011 to further emphasize the international character of the [Faculty of Engineering \(Technische Fakultät\)](#). As a study program, CME reflects the international orientation of the communications and multimedia technology research staff at the Faculty of Engineering of FAU. With numerous internationally acclaimed scholars (including three IEEE Fellows) in the teaching staff, CME was also conceived to closely cooperate with the [International Audio Labs](#), a joint research and graduate teaching facility of the FAU and [Fraunhofer IIS](#), with an initial budget of 60 million Euro dedicated to research in audio and multimedia. Thus, a teaching and research environment was created that should attract excellent bachelor graduates from all over the world and offer them a world-class starting point for their career.

Chapter 2

Information for Prospective Students

2.1 Prerequisites

CME emphasizes fundamental concepts of modern technologies in the areas of signal processing and communications. In order to benefit from the demanding Master's program, students need to possess excellent education in these fields at the bachelor's level, encompassing both theoretical understanding and programming skills for practical applications.

In particular, students need a **strong foundation and working knowledge** in the following fields:

- **Engineering Mathematics:** linear algebra, complex analysis, linear differential equations, Fourier transform, Laplace transform, z-transform, probability and random variables
- **Signals and Systems** (e.g., A. V. Oppenheim and A. S. Willsky, *Signals and Systems*, Pearson Education Limited, 2nd ed., 2013)
- **Communications** (e.g., S. Haykin and M. Moher, *Communication Systems*, Wiley, 5nd ed., 2009)
- **Stochastic Signals** (e.g., A. Papoulis and S. U. Pillai, *Probability, Random Variables and Stochastic Processes*, McGraw-Hill Professional, 4th ed., 2002)
- **Skills in a programming language** such as C/C++, MATLAB, and Python (e.g., M. Müller and S. Rosenzweig, *PCP notebooks: A preparation course for Python with a focus on signal processing*, Journal of Open Source Education (JOSE), 5 (2022), pp. 148:1-5)

2.2 Application

Deadline: March 15/ July 15¹

The CME program has an intake only in winter semester. Applicants have to apply via FAU's [online application portal campo](#). The application portal opens in February.

The following documents need to be uploaded as scanned copies:

- CME application form ([download available on the CME website](#))

¹ The first deadline is for students who have to apply for a visa abroad.

- Curriculum vitae (CV) including a passport picture (necessary for identification in online interviews)
- Secondary school's leaving certificate and university entrance certificate (certified English or German version)
- Bachelor's degree and academic transcripts (certified English or German version)
- TOEFL score report (minimum score IBT 80) or other proof of English-language education (IELTS 6.0, [level B2 of the Common European Framework of Reference for Languages](#), or Medium of Instruction Certificate e.g.)
- APS certificate (for applications from China, Vietnam and India)
- GRE test results (optional)
- certificates for German language courses or tests (optional)
- recommendation letters of two of your academic teachers that know you well (optional)

Minimum **grade requirement** (Bachelor's degree) for application is **2.5 in German grading system** (please use the [modified Bavarian formula for calculation](#)).

Selected applicants will be invited for a face-to-face or telephone interview. The interview takes approximately 30 minutes and serves to assess the background and the motivation for a successful completion of the CME program. After the screening process you will be informed whether you have been selected for admission to the CME program.

2.3 Admission and enrollment to the program

Students have to observe the instructions given on the online application portal campo. Students who have not received their Bachelor's degree yet should submit their latest transcript of records and a certificate of their university with the date of their foreseeable graduation. The Master's Office will then carry out the formal application procedure.

Students who have received an admission offer for the CME program, need to enroll. The [enrollment process](#) is managed by FAU's [Student Records Office](#).

In order to enroll, students need to send several documents by mail to the Student Records Office (Studentenkanzlei, Halbmondstrasse 6-8, Erlangen):

- Signed Enrollment request ("Onlineantrag auf Einschreibung"; available in campo) (scanned copy)
- Passport – (in case of enrollment per post or email: copy of passport)
- School certificate of qualification for university entrance – (in case of enrollment per post: certified copy; per email: scanned copy). If the original certificate was not issued in German, English, or French, a certified translation is required.
- Your latest diploma/Bachelor degree certificate – (in case of enrollment per mail: certified copy; per email: scanned copy). If the original certificate was not issued in German, English, or French, a certified translation is required.
- Electronic confirmation of health insurance (known as M10). Apply for it at your health insurance provider quoting FAU's reference number (H0001887). The health insurance company will then send a digital copy directly to FAU.

- Confirmation of semester fee payment (e.g., bank transfer confirmation, bank statement. The following data should be visible: account holder, IBAN, BIC, date of bank transfer, payment reference, and amount paid. All other data can be redacted.)
- Admissions letter from FAU (scanned copy)

2.4 Re-Registration

The [re-registration](#) (*Rückmeldung*) serves as a confirmation for the enrollment in the next semester. The re-registration does not require appearing at the Student Records Office, but is effectuated by the bank transfer of the student services contribution (*Semesterbeitrag*). All students receive a remittance slip together with their semester documents.

Students have to observe the respective dates. Failure to observe the time-limit may result in expulsion! The payment is due 6 - 8 weeks before the semester starts. You find the list with the corresponding deadlines on the [FAU website](#).

2.5 Orientation Weeks

From the first week of October the Central Office for International Affairs arranges [Orientation Weeks for all international students](#). For all those who have no or only little German language knowledge, it is advisable to come to Germany that early to be assisted by the International Office when handling all formalities like enrollment, opening of a bank account or contracting a health insurance. Furthermore, there are leisure events organized that help newly arrived students to meet and connect.

2.6 Intensive course for German (outside the lecture period)

The Language Centre of the FAU (*Sprachenzentrum*) offers an [intensive course for German](#) for international students from mid-September until the beginning of October. The obtained credits can be fully acknowledged. The deadline for the registration for the intensive course for German is usually at the end of July. Interested Students should [register directly with the Language Centre](#).

2.7 Scholarships

FAU unfortunately does not offer its own scholarships. Each student may however apply for scholarships offered by various organizations (foundations, companies, political parties, religious groups etc.). The scholarships are not always awarded based on performance in previous studies alone. The German Academic Exchange Service (DAAD) offers a comprehensive [list of different possible funds](#). Furthermore, FAU has also compiled a [list of foundations](#) offering a variety of scholarships (only available in German).

2.8 Student jobs

Students are allowed to [work outside the university](#) while being enrolled. As the CME curriculum is designed for full-time students, the extra workload for money-making should be restricted. Student jobs are also offered by the chairs of the university. They usually allow for

a convenient timing in compliance with courses and without extra commuting time. The bulletin boards and websites of the respective chairs should be checked for this.

Non-EU citizens are only able to take up an employment if they have a **work permit**. Deducted taxes can be reclaimed by means of an annual wage-tax adjustment at the tax office as long as they do not exceed the annual tax-free amount.

Students from non-EU countries may work 140 full days or 280 half days per year. In addition, employment as a student assistant at the University is permitted and is not counted towards the 140 full or 280 half working days. EU-students have unrestricted working times, but of course should keep their studies-work balance in mind.

Chapter 3

General Program Structure

3.1 Overall structure of the program

The Master's study program is offered completely in English language. With a total duration of four semesters, it foresees three semesters of lectures that consist of compulsory courses, compulsory elective courses and elective courses. The compulsory courses also include three lab courses, a research internship, and a seminar. In order to allow international students an ideal integration into German-speaking environments, three semesters of compulsory German language training are included in the curriculum. The last semester is mainly dedicated to the preparation of the Master's thesis.

3.2 European Credit Point System ECTS

According to the European Credit Transfer System (ECTS) each course is assigned a number of points, so-called ECTS-points, which represent the expected associated workload in full hours, where 1 ECTS credit point corresponds to 30 hours (60 min per hour) per semester. The ECTS system replaces the previously used "Semesterwochenstunde" (SWS = weekly hours during the lecturing period, with one academic hour (SWS) corresponding to 45 minutes). The typical conversion rate in Electrical Engineering is 2.5 ECTS=2 SWS.

3.3 Grading system

The grading system is regulated in §18 of the General Examination Regulations of the Faculty of Engineering

1,0	excellent	an excellent achievement	passed
1,3			
1,7	above average	an achievement that meets the requirements distinctly above average	
2,0			
2,3			
2,7	average	an achievement that complies with the requirements	
3,0			
3,3			
3,7	adequate	an achievement that, despite of occurring shortcomings, still complies with the requirements	
4,0			
4,3	not adequate	an achievement that, because of significant shortcomings, does not meet the requirements	not passed
4,7			
5,0			

The final cumulative grade for the Master's Examination is the arithmetic average over all graded modules weighted by the respective number of ECTS credit points and allows only one decimal place.

Cumulative Grade	Cumulative Grading
≤1,5	excellent
1,6 ... 2,5	above average
2,6 ... 3,5	average
3,6 ... 4,0	adequate

Whoever completes the Master's Examination with a cumulative grade from of 1,2 or better obtains the distinction

„graduated with distinction“.

3.4 Modularity of lectures

The Master's program comprises a set of modules. To each module, an ECTS value is assigned, which should describe the associated workload for an average student including attendance of lectures and preparation for examinations (1 ECTS point corresponds to 30 hours of 60 minutes).

A module constitutes a consistent and temporally coherent study unit that is usually (but not necessarily) concluded with an examination. Examinations are *studienbegleitend*, which means that the written or oral examination takes place during the semester or during the following exam periods. A module usually consists of a lecture (*Vorlesung*) and a supplemental class or tutorial (*Übung*). Some modules might also contain a lab course (*Praktikum*). A lecture and the accompanying supplemental course or a tutorial belong together and cannot be credited as separate classes. Typically, the lecture is given by a faculty member, while the supplemental course or tutorial is taught by a teaching assistant. Students are strongly advised to actively participate in the supplements. The supplements are often accompanied by assignments. For each module, there are one or more faculty members that are responsible for that module.

The module content and examination modality, i.e., whether the examination is performed in written or oral form and the duration of the examination, are specified in detail in the module description (*Modulbeschreibung*). A module examination (*Modulprüfung*) might consist of one or more partial examinations (*Teilprüfungen*). A partial examination can lead to either a pass/fail decision (*unbenotete Studienleistung*) or can be graded (*benotete Prüfungsleistung*). The final grade of the module (*Modulnote*) is computed as a weighted sum of the grades obtained in the partial examinations. Finally, there are seminars (*Seminare*), which focus on different research topics each semester and where students contribute own presentation and engage in scientific discussions. Generally, the responsible faculty member or instructor for each module announces the requirements for successful completion of the module, and it is each student's responsibility to inform herself/himself about these requirements.

3.5 Study Plan

Note: Students who started studying before winter semester 2023/24 (PO-Version 2011) must complete Speech and Audio Signal Processing as a Compulsory Module. They only need to choose 5 ECTS of Technical Courses.

Study Plan for full-time students (start of studies in or after winter semester 2023/24)

No.	Module Group	Credits	1.Sem	2.Sem	3.Sem	4.Sem	Type of Examination
	Name of Module		ECTS	ECTS	ECTS	ECTS	
	Compulsory Modules						
M1	Digital Communications	5	5				90 Min (written)
M2	Information Theory and Coding	5	5				120 Min (written)
M3	Digital Signal Processing	5	5				90 Min (written)
M4	Mobile Communications	5		5			120 Min (written)
M5	Statistical Signal Processing	5	5				90 Min (written)
M6	Image and Video Compression	5		5			90 Min (written)
	Compulsory Elective Modules						
M7	Lab courses (Practicals)	7.5	2.5	2.5	2.5		successful participation
M8	Research Internship	10			10		see guidelines of the module
M9	Seminar	2.5			2.5		presentation
M10	Technical Courses	10		5	5		see guidelines of the module
	Non-Technical Compulsory Elective Modules						
M11	Languages, soft skills	15	5	5	5		see guidelines of the module
	Elective Modules						
M12	Technical Electives	15	2.5	7.5	5		see guidelines of the module
M13	Master's Thesis	30				30	
		120	30	30	30	30	

Study Plan for part-time students (start of studies in or after winter semester 2023/24)*

No.	Module Group	Credits	1. Sem	2. Sem	3. Sem	4. Sem	5. Sem	6. Sem	7. Sem	8. Sem	Type of Examination
	Name of Module		ECTS	ECTS	ECTS	ECTS	ECTS	ECTS	ECTS	ECTS	
	Compulsory Modules										
M1	Digital Communications	5			5						90 Min (written)
M2	Information Theory and Coding	5	5								120 Min (written)
M3	Digital Signal Processing	5	5								90 Min (written)
M4	Mobile Communications	5				5					120 Min (written)
M5	Statistical Signal Processing	5			5						90 Min (written)
M6	Image and Video Compression	5		5							90 Min (written)
	Compulsory Elective Modules										
M7	Lab courses (Practicals)	7.5				2.5	2.5	2.5			successful participation
M8	Research Internship	10						10			see guidelines of the module
M9	Seminar	2.5						2.5			presentation
M10	Technical Courses	10		5			5				see guidelines of the module
	Non-Technical Compulsory Elective Modules										
M11	Languages, soft skills	15	5	5	5						see guidelines of the module
	Elective Modules										
M12	Technical Electives	15				7.5	7.5				see guidelines of the module
M13	Master's Thesis	30							15	15	
		120	15	15	15	15	15	15	15	15	

***The courses of the part-time study program take place at the same time as the courses of the full-time study program, i.e., there are no special night classes or weekend classes.**

3.6 Module Catalogue

The [CME module catalogue](#) is published and continuously updated on the CME website. Please refer to the catalogue on the website for the most current information.

Detailed descriptions about the individual modules can be found in the **CME module handbook**. The module handbook is available on the [CME website](#).

COMPULSORY MODULES (30 ECTS):

- DIGITAL COMMUNICATIONS (5 ECTS, WS, 47800)
- DIGITAL SIGNAL PROCESSING (5 ECTS, WS, 93500)
- INFORMATION THEORY AND CODING (5 ECTS, WS, 93601)
- STATISTICAL SIGNAL PROCESSING (5 ECTS, WS, 96430)
- MOBILE COMMUNICATIONS (5 ECTS, SS, 43141)
- IMAGE AND VIDEO COMPRESSION (5 ECTS, SS, 96310)

TECHNICAL COURSES (CHOOSE 10 ECTS):

- ADVANCED OPTICAL COMMUNICATION SYSTEMS (5 ECTS, WS, 621649)
- ADVANCED TOPICS IN PERCEPTUAL AUDIO CODING (2.5 ECTS, WS, 96875)
- EQUALIZATION AND ADAPTIVE SYSTEMS FOR DIGITAL COMMUNICATIONS (2.5 ECTS, WS, 43400)
- IMAGE, VIDEO, AND MULTIDIMENSIONAL SIGNAL PROCESSING (5 ECTS, WS, 96312)
- MACHINE LEARNING IN SIGNAL PROCESSING (5 ECTS, WS, 48440)
- MULTIUSER INFORMATION AND COMMUNICATIONS THEORY (5 ECTS, WS, 687141)
- MUSIC PROCESSING – SYNTHESIS (2.5 ECTS, WS, 502007)
- MUSIC PROCESSING – ANALYSIS (2.5 OR 5 ECTS, WS, 302148 OR 639119)
- PATTERN RECOGNITION (5 ECTS, WS, 44130)
- SIGNAL ANALYSIS (2.5 ECTS, WS, 250058)
- SPEECH ENHANCEMENT (2.5 ECTS, WS, 788996)
- ADVANCED COMMUNICATION NETWORKS (5 ECTS, SS, 151664)
- ARCHITECTURES FOR DIGITAL SIGNAL PROCESSING (5 ECTS, SS, 96010)
- AUDITORY MODELS (2.5 ECTS, SS, 947709)
- LINEAR AND NON-LINEAR FIBRE OPTICS (5 ECTS, SS, 267499)
- MIMO COMMUNICATION SYSTEMS (5 ECTS, SS, 96300)
- PATTERN ANALYSIS (5 ECTS, SS, 44120)
- TRANSMISSION AND DETECTION FOR ADVANCED MOBILE COMMUNICATIONS (2.5 ECTS, SS, 43420)
- TRANSFORMS IN SIGNAL PROCESSING (2.5 ECTS, SS, 498723)

LAB COURSES/PRACTICALS (CHOOSE 7.5 ECTS):

- AUDIO PROCESSING LABORATORY (2.5 ECTS, WS/SS, 894349)
- DIGITAL COMMUNICATIONS (2.5 ECTS, WS/SS, 93511)
- DIGITAL SIGNAL PROCESSING (2.5 ECTS, WS, 97520)
- IMAGE AND VIDEO SIGNAL PROCESSING ON EMBEDDED SYSTEMS (2.5 ECTS, WS, 97525)

- MACHINE LEARNING AND SYSTEMS (2.5 ECTS, WS, 47574)
- COMMUNICATIONS SYSTEMS DESIGN (2.5 ECTS, SS, 92356)
- IMAGE AND VIDEO COMPRESSION (2.5 ECTS, SS, 97651)
- MACHINE LEARNING IN SIGNAL PROCESSING (2.5 ECTS, SS, 878210)
- MOBILE COMMUNICATIONS (2.5 ECTS, SS, 97640)

SEMINAR (CHOOSE 2.5 ECTS):

- AUDIO PROCESSING SEMINAR (2.5 ECTS, WS/SS, 330542)
- SELECTED TOPICS IN COMMUNICATIONS (2.5 ECTS, WS, 775681)
- SELECTED TOPICS IN MACHINE LEARNING (2.5 ECTS, WS/SS, 92374)
- SELECTED TOPICS IN MULTIMEDIA COMMUNICATIONS AND SIGNAL PROCESSING (2.5 ECTS, WS/SS, 914949)

TECHNICAL ELECTIVES (CHOOSE 15 ECTS):

- ADVANCED C++ PROGRAMMING (2.5 ECTS, WS/SS, ONLINE COURSE VIA [VHB](#), 44466)
- INTERVENTIONAL MEDICAL IMAGE PROCESSING (5 ECTS, WS/SS, ONLINE COURSE VIA [VHB](#), 44140)
- BODY AREA COMMUNICATIONS (2.5 ECTS, WS, 816185)
- ADVANCED NETWORKING LEX (5 ECTS, WS, 869547)
- COMMUNICATIONS SYSTEMS DESIGN (5 ECTS, WS, 92355)
- COMPUTER GRAPHICS (5 ECTS, WS, 43822)
- CONVEX OPTIMIZATION IN COMMUNICATIONS AND SIGNAL PROCESSING (5 ECTS, WS, 96850)
- DEEP LEARNING (5 ECTS, WS, 901895)
- DIAGNOSTIC MEDICAL IMAGE PROCESSING (5 ECTS, WS/SS, ONLINE COURSE VIA [VHB](#), 44150)
- GENERATIVE MODELS FOR SIGNAL PROCESSING (2.5 ECTS, WS, 44973)
- INTRODUCTION TO DEEP LEARNING (5 ECST, WS, 43405)
- MACHINE LEARNING FOR TIME SERIES (5 ECTS, WS, 428256)
- MACHINE LEARNING IN COMMUNICATIONS (5 ECTS, WS, 668129)
- MATHEMATICAL OPTIMIZATION IN COMMUNICATIONS AND SIGNAL PROCESSING (5 ECTS, WS, 48400)
- MOLECULAR COMMUNICATIONS (5 ECTS, WS, 454183)
- RADAR SIGNAL PROCESSING (5 ECTS, WS, 44400)
- RANDOM MATRICES IN COMMUNICATIONS AND SIGNAL PROCESSING (5 ECTS, WS, 451971)
- ADVANCED TOPICS IN DEEP LEARNING (5 ECTS, SS, 42800)
- AUDIO PROCESSING FOR THE INTERNET OF THINGS (2.5 ECTS, SS, 44522)
- COGNITIVE NEUROSCIENCE FOR AI DEVELOPERS (5 ECTS, SS, 44445)
- GAME THEORY WITH APPLICATION TO INFORMATION ENGINEERING (5 ECTS, SS, 48432)
- CHANNEL CODING (5 ECTS, SS, 96270)
- CHANNEL CODING ON GRAPHS (5 ECTS, SS, 412023)
- CIRCUITS AND SYSTEMS OF TRANSMISSION TECHNIQUES (5 ECTS, SS, 96410)
- COMPUTER VISION (5 ECTS, SS, 713618)

- HUMAN COMPUTER INTERACTION (5 ECTS, SS, 645618)
- NEXT GENERATION MOBILE COMMUNICATION SYSTEMS: 5G-ADVANCED AND 6G (2.5 ECTS, SS, 96065)
- PERCEPTION IN ROBOTICS (5 ECTS, SS, 42801)
- RADAR, RFID AND WIRELESS SENSOR SYSTEMS (RWS) (5 ECTS, SS, 96316)
- REINFORCEMENT LEARNING (5 ECTS, SS, 93185)
- SELECTED TOPICS IN ASC (5 ECTS, SS, 48451)

3.7 Master's thesis

A Master's thesis (*Masterarbeit*) is a piece of **original scientific work** conducted under the direction of a faculty advisor. The Master's thesis is intended to demonstrate students' ability to solve scientific problems in the field of communication and multimedia engineering independently.

Topics are announced on the chairs' websites or can be requested directly from the professors. Students may also suggest a topic themselves. All full-time university lecturers teaching at the [Department of Electrical Engineering \(EEI\)](#) are entitled to supervise Master's theses. The requirements of the Master's thesis are to be set in such a way that it can be completed within **six months** with a processing time of **approximately 900 hours**.

Prerequisite for admission to the Master's thesis is that students have passed all compulsory modules and have acquired at least 80 ECTS points.

The thesis consists of a **written part** and an **oral part**. There is no mandatory length for the written part of a thesis. Most Master's theses have between 50 and 80 pages. However, depending on the topic, more or fewer pages may be appropriate. If the written part is graded at least *sufficient*, you must present the results of your work in an oral presentation of approximately 30 minutes length with subsequent discussion. The date for the final presentation is set by the supervising university lecturer.

Make sure to adhere to the standards of good scientific practice. Meticulously **reference all your sources and cite correctly**. Plagiarism is a serious academic misconduct. If you need support, use the workshops and services of the [FAU Writing Centre](#).

3.8 Research Internship

The research internship (*Forschungspraktikum*) should ideally be completed in the third semester after having passed all compulsory modules. The aim of the research internship is to provide some hands-on experience in research. It is usually conducted at a university chair.

[Every chair of the Department Electrical Engineering \(EEI\)](#) and the [chair of Pattern Recognition](#) are eligible to supervise the research internship. It is, however, recommended to choose a chair that is closely associated with the CME study program, e.g. [LMS](#), [IDC](#), [AudioLabs](#) or [LIKE](#).

The research internship can also be conducted at a research-oriented company. In these cases it is nonetheless obligatory to find a supervising chair at either the Department Electrical Engineering (EEI) or the chair of Pattern Recognition. Make sure to first contact your potential supervising professor before engaging in any discussions with a possible industry partner.

The research internship has a workload of 10 ECTS (**300 hours**). For completion, a **presentation** of about 20 minutes has to be given and a **report** of 10 to 15 pages has to be written.

Before starting the research internship a **task description** needs to be filled in by the supervising chair. The task description lists the research goal, the start date and other details that help to clarify the extent, expectations and aim of the individual research internship. Please note that there is no specific form for the task description. Supervising chairs should use and, if needed, adapt the templates that they usually use in similar cases.

A registration in campo is not necessary to start the research internship. The supervisor informs the Examination Office as soon as the research internship has been completed. Please note: In campo the research internship is listed with the title from the task description. The research internship is **not graded**. It is a pass/fail achievement.

In case of questions on the technical details of the research internship, contact [CME Study Advisor Dr.-Ing. Heinrich Löllmann](#).

3.9 German language courses and Soft Skills

The curriculum of the CME Master's program includes compulsory elective **modules from non-engineering subjects** ([German language courses](#), other language courses or Soft Skills) with an accumulated weight of 15 ECTS.

The qualification goal of the elective modules from non-engineering subjects is to enable students to expand their technical competence profile through general language, social, methodological and personal competencies.

The modules from non-engineering subjects are **graded** and will be included in the calculation of the final grade in CME.

The range of German language classes is divided into three stages: elementary (A1, A2), mid-level (B1, B2) and upper-level (C1). To complete one level, a workload of at least 10 ECTS is usually required. German courses are held in Erlangen as well as in Nürnberg. To assess the prior German language knowledge of each student, [placement tests](#) must be taken in the first week of the lecture period. **Absolute beginners** do not need to take a placement test, but register for a course Deutsch A1.1: Allgemeinkurs.

Students can already begin to study German before the lecture period starts if they attend the [intensive course for German](#).



Students who do not have verifiable German language proficiency on level B2 or higher must earn all 15 ECTS with German language courses.

If you are a **native speaker of German** or if you already have **verifiable German language proficiency on level B2**, please contact the [CME degree program coordinator](#). In that case, you will receive a confirmation that you are exempt from the obligation to take German language courses. If a student reaches level B2 German language proficiency and still has some ECTS of non-engineering electives open, he or she is allowed to earn the remaining ECTS with other non-engineering electives.

Examples:

Case 1: A student starts with no knowledge of German. He or she is obliged to earn all 15 ECTS with German language courses: A1.1 Deutsch (5 ECTS) + A1.2 Deutsch (5 ECTS) + A2.1 Deutsch (5 ECTS). All three German language courses are graded and influence the final grade in CME. It is not possible to exchange any of the obligatory German language courses with another non-engineering elective.

Case 2: A student starts with advanced knowledge of German. He or she takes B2.1 Deutsch (5 ECTS) + B2.2 Deutsch (5 ECTS). When successfully finishing the course B2.2 Deutsch, the student reaches German language proficiency level B2. He or she can choose how to earn the remaining 5 ECTS with non-engineering electives. The student could, for example, take another German course or another non-engineering elective such as an English language course. The grades from the German courses B2.1 Deutsch and B2.2 Deutsch cannot be exchanged with another non-engineering elective.

Case 3: A student holds a Goethe-Zertifikat B2 when starting their studies in CME. He or she is not obliged to take German language courses, but can choose from the catalogue of non-engineering electives. However, since he or she is not a native speaker of German it is also allowed to earn all 15 ECTS with higher-level German language courses (specialized courses on B2 level or C1 Deutsch).

It is not allowed to exchange an obligatory German language course with another non-engineering subject.

For information on German classes, contact the [Department of German as a Foreign Language in FAU's Language Centre](#). Contact: sz-daf-info@fau.de.

3.10 Registration for examinations

Students always have to **actively register** correctly for examinations via the internet platform [campo](#). The registration function is only activated during **registration periods**. Students are able to withdraw from their registration without giving any reason within **three working days before the examination** is taking place.

After this three-day period a withdrawal from an examination is only possible for a legitimate reason such as an **illness**. In case of an illness it is obligatory to obtain a medical certificate from a doctor and submit it to the Examination Office of the Faculty of Engineering.

Examination participants, who have to discontinue the examination due to health reasons, should observe the following procedure:

1. They are asked to go to one of the university hospitals (depending on the kind of their illness) immediately. Addresses are listed in Chapter 6.
2. They should submit this leaflet at the university hospital without further notice.
3. In the medical certificate of the university hospital must be mentioned if there is a disability to do the exam and whether this occurred before or during the exam.

4. Please ask for acceptance of the exam cancellation. The medical certificate can be handed in later.
5. Afterwards the medical certificate has to be forwarded to the Examination Office.

Note of the exam supervisor

Name of the exam participant: _____

Date of the exam: _____

Start of the exam: _____

Discontinuing of the exam: _____

Name and signature of the examiner or supervisor

3.11 Repetition of examinations

A student who failed an examination can take **three resit examinations**. The re-examination should be taken at the next available date, normally within six months after the result of the first exam has been communicated. The student has to actively register in campo for the resit examination during the registration periods. Note: The Master's thesis can only be retaken once.

For more information on examinations, see the [website of the Examinations Office and see the general rules on withdrawing from examinations for reasons of illness](#).

3.12 Examination deadlines

Students are expected to pass the examinations in due time so that they obtain the required 120 ECTS credits within the intended study period of four semesters. The required ECTS credits have to be obtained within six semesters at the latest.

The **regular duration of studies** within CME is four semesters (*Regelstudienzeit*). It is allowed to exceed this regular duration of studies by two semesters without the need to take any specific action. You only need to re-register for the fifth and sixth semester (*Rückmeldung*).

If it turns out to be necessary to extend the deadline for completing the Master's program CME even further into a seventh semester it is necessary to submit a [formal request for extension](#) to the [Examination Office of the Faculty of Engineering](#).

Please note that requests for extensions are only granted if a student shows sufficient progress in his or her studies so that it can be assumed that they will graduate in a reasonable time.

3.13 Compensation for disadvantages due to chronic illness and disability

Students with disabilities or chronic illnesses can apply for compensation for disadvantages in examinations (e.g., longer processing time, approval of aids). This applies to all physical and mental impairments that last at least 6 months, as well as to illnesses that require at least one medical treatment per quarter over the course of a year. A certificate of severe disability is not required for disadvantage compensation. Furthermore, the disadvantage compensation does not appear in the certificate documents. If you are interested in applying for a disadvantage compensation, you can find further information on [FAU's website](#).

Chapter 4

Studying in Erlangen

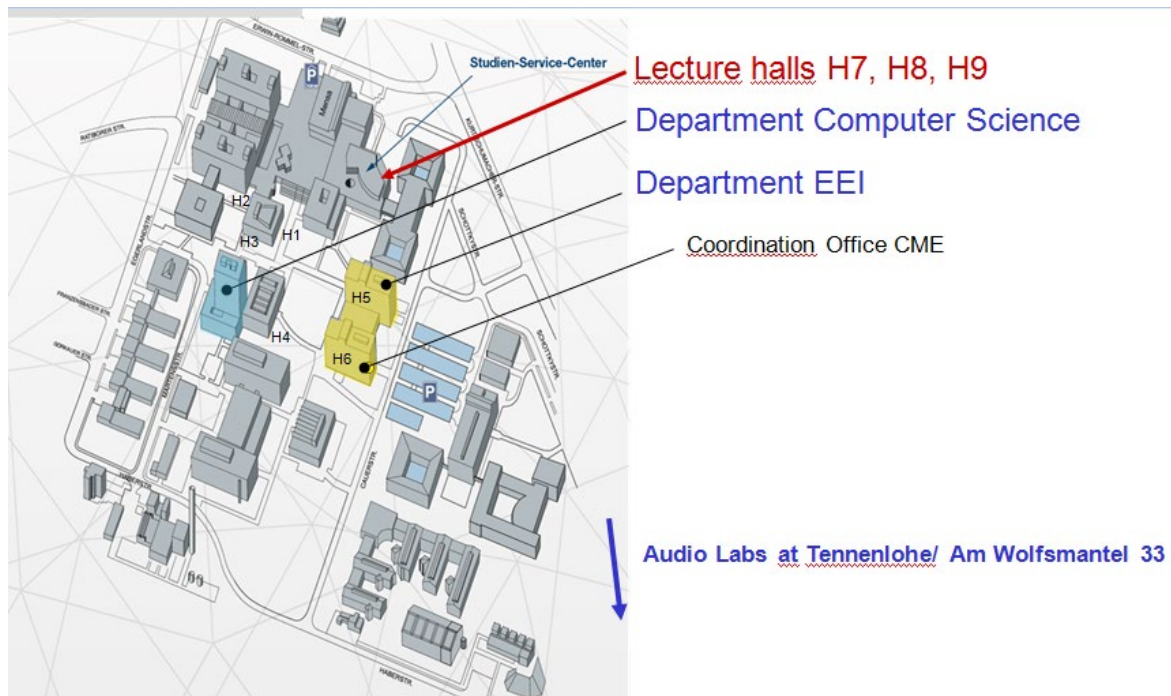
4.1 Erlangen and its surrounding area

The [University of Erlangen-Nürnberg](#) was founded in 1743 and currently has around 40,000 students. The [Faculty of Engineering](#) (Technische Fakultät) with about 10,500 students is located in Erlangen, a city with a historic baroque center which is located amongst splendid landscapes close to the rocky hills and lovely forests of the [Fränkische Schweiz](#). The cities of Nuremberg (a traditional center of arts and commerce since medieval times) and Bamberg (a UNESCO world heritage town) lie about 20 km to the south and 40 km to the north, respectively. Bayreuth is about 80 km away, while Munich, Frankfurt and Stuttgart, the other large cities of southern Germany, can all be reached within about 2 hours journey by train or car. One of Erlangen's best known and most loved attractions is the *Bergkirchweih*, a beer festival in spring, which attracts around 1 million visitors from near and far.

4.2 Research and industry

In the wider world, Erlangen is also renowned both as home to the second largest university in Bavaria and as one of the three headquarters of Siemens AG, which both contribute substantially to the high living standard in and around the city. With its broad range of additional privately and publicly funded research facilities and many start-up high-tech companies, Erlangen and its surroundings have developed into an important European R&D center in several future-oriented areas of engineering, including core CME areas, such as medical systems, microelectronics, audio ([Fraunhofer IIS](#), Dolby), multimedia and communications (e.g., Intel, Nokia).

4.3 Site plan of the main campus of the Faculty of Engineering



4.4 Housing

The housing situation in Erlangen is difficult. The university unfortunately cannot organize or guarantee accommodation for students. Students are responsible for finding suitable accommodation themselves. The university offers support via its [Accommodation service](#). There is a limited contingent of dormitory places of the Studentenwerk for international students. All students interested in a dormitory place have to contact the accommodation service and apply at accommodation@fau.de. Upon receipt of an offer by the Studentenwerk, the students have to accept the dormitory place within two weeks by faxing the signed contract and paying the deposit and the rent for the first two months. Dormitory places of the Studentenwerk are relatively inexpensive but students are allowed to live in such a dormitory only for one year at most. Beyond the range of student dormitories, the Studentenwerk offers also a [private housing referral service](#).

Chapter 5

Important Internet Platforms at FAU

5.1 [IdM = Identity Management](#)

The Identity Management System (IdMS) of FAU is the central personal administration of the university. Data from various source systems are imported, processed and routed to target systems, such as WLAN (eduroam), e-mail addresses, FAUcard and university library, so that, for example, central password management is possible across all connected systems. After enrollment, students receive a letter with information on the IdM activation process from the Student Records office. After the activation of the IdM account, the very important [FAUcard](#) will be sent to them. The FAUcard can be used for the cafeteria, the library, or as a printing card. By activating, her/his idM account each student will also get her/his own email address.

5.2 [StudOn](#)

StudOn is the internet platform for online learning and course management. Here students can find lecture documents like lecture notes or exercises. It provides internet forums for students and working teams and allows the exchange of information between students and lecturers. Here students may be able to post their questions on bulletin boards. Some lecturers provide also e-learning courses that can be downloaded from StudOn.

5.3 [Campo](#)

This online platform campo serves as the online administration of the Admission Office, the Student Records Office and the Examination Office. The campo portal covers the organization of applications, admissions and enrollments as well as the administration of students, courses, examinations and grade booking, modules and rooms. Students have to administrate their study data there and register for examinations via campo. The registration period usually starts in the mid of November or May and lasts about two weeks. On this platform, students can review their current grades and view their transcript of records. Beyond that, campo enables the printing of enrollment certifications and the remittance form for every semester.

5.4 [OPACplus](#)

OPACplus is the online catalogue of the [FAU library](#). It contains media stock of the main library and their branches. Students obtain access to different research magazines online. OPACplus also offers inter-library borrowing from libraries all over Germany. Foreign students are able to book guided [library tours in English language](#).

Chapter 6

Contact Persons and Addresses

Spokesperson

Prof. Dr.-Ing. Wolfgang Gerstacker
Institute for Digital Communication
Phone: +49 9131 85-27694
Email: wolfgang.gerstacker@fau.de
Address: Cauerstr. 7, 91058 Erlangen

Study Advisor

Dr.-Ing. Heinrich Löllmann
Multimedia Communications and Signal Processing
Phone: +49 9131 85-20173
Email: heinrich.loellmann@fau.de
Address: Cauerstr. 7, 91058 Erlangen

Degree Program Coordinator

Dr. Vivien Aehlig
Department of Electrical, Electronics and Communications Engineering
Phone: +49 9131 85-71175
Email: vivien.aehlig@fau.de
Address: Cauerstr. 7, 91058 Erlangen
Room: R. 01.034

Selection Commission

Prof. Dr. Meinard Müller
Prof. Dr. Vasileios Belagiannis
Prof. Dr.-Ing. Wolfgang Gerstacker

[International Office \(IO\)](#)

Faculty of Engineering
Christine Mohr
Phone: +49 9131 85-27851
Email: christine.mohr@fau.de
Address: Erwin-Rommel-Str. 60, 91058 Erlangen
Room: R. U1.250

[Student Records Office](#)

Address: Halbmondstr. 6-8, 91054 Erlangen
Phone: +49 9131 85-24029

[Examination Office](#)

Andrea Wilfert
Phone: +49 9131 85-26707

Email: andrea.wilfert@fau.de
Address : Halbmondstr. 6, 91054 Erlangen

Central Office for International Affairs

Phone: +49 9131 85-24800
Email: welcome-students@fau.de
Address: Schlossplatz 3, 91054 Erlangen

Language Centre

Department German as a foreign language
Bismarckstr. 10, 91054 Erlangen
Email: sz-daf-info@fau.de

Tax Office

Finanzamt Erlangen
Schubertstr. 10
D-91052 Erlangen
Phone: +49 9131 121-0
<http://www.finanzamt.bayern.de/Erlangen/>

Residence Office

Ausländerbehörde Stadt Erlangen
Rathaus – 2nd Floor
Rathausplatz 1, 91052 Erlangen
Phone: +49 9131 862879
Names starting with A to L: Phone: +49 (0) 9131 86 2879, Room 215
Names starting with M to Z: Phone: +49 (0) 9131 86 2089, Room 214

UNIVERSITY HOSPITAL DEPARTMENTS AND EMERGENCY PHONE NUMBERS

Students who are enrolled in the CME Master's program need to have sufficient [health insurance](#). That means they benefit from Germany's healthcare system and will be treated by a doctor when needed. If students do not feel well or have complaints it is best to go to a general practitioner (GP) first, or as it is called in German "*Hausärztin/Hausarzt/Allgemeinmedizinerin/Allgemeinmediziner*". They will assess whether the illness or injury should be treated by a specialist. [Search here](#) if you are looking for a medical practice or a psychotherapy practice nearby where English is spoken.

For emergencies, at night or on the weekend, students can also always go to a hospital. **In case of life-threatening emergencies, call 112 to contact emergency services.** This is also covered by health insurance.

If it's not an emergency, but the complaints are so urgent that students cannot wait for a GP's opening hours, they can reach on-call doctors via [calling 116 117](#).

Erlangen is home to a big and very renowned hospital, the [Universitätsklinikum Erlangen](#) that also offers several [emergency services](#).

Life-threatening emergencies:	112
Rescue Coordination Centre (in all Bavaria)	112
Poison Control Centre	+49 89 19240
Accident and emergency units at UK Erlangen:	
Accident and emergency unit for internal medicine (including Chest Pain Unit and Department of Dermatology) Ulmenweg 18, for cars via Krankenhausstraße	+49 9131 85-35420
Accident and emergency unit concerning head injuries (including Stroke Unit and mental emergencies) Schwabachanlage 6	+49 9131 85-34338
Accident and emergency unit for surgery Entrance Maximiliansplatz	+49 9131 85-33260
Medical On-Duty Service:	
With the call number 116117 you can reach the patient service with the medical on-call service around the clock - 24 hours a day, 7 days a week. This service is only available in German.	116 117 Website
Psychological Services for Students:	
Counselling and Psychological Services for Students of the Faculty of Engineering	+49 9131 85-27934 +49 9131 85-27935 Website