

These examination regulations have been worded carefully to be up to date; however, errors cannot be completely excluded. The official German text available from L1 – Office of Legal Affairs and Academic Quality Management is the version that is legally binding.

Note: Students who started their studies before the latest amendment came into effect are requested to also comply with previous amendments and the respective transitory provisions.

**Degree Programme and Examination Regulations for the
Elite Master’s Degree Programme Advanced Signal Processing & Communications Engineering (ASC) – FPOASC –
at the Faculty of Engineering,
Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU)
Dated 29 February 2016**

amended by statutes of
22 February 2019
28 August 2020
1 July 2021

Based on Section 13 (1)(2), Section 43 (5)(2), Section 58 (1) and Section 61 (2)(1) of the Bavarian Higher Education Act (Bayerisches Hochschulgesetz, **BayHSchG**), FAU enacts the following degree programme and examination regulations:

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Part 1: General Provisions

Preamble

FAU offers an Elite Master's degree programme in Advanced Signal Processing & Communications Engineering (ASC) as part of the Elite Network of Bavaria.

Section 34 Scope

The degree programme and examination regulations for the Elite Master's degree programme in Advanced Signal Processing & Communications Engineering (ASC) complement the current version of the General Examination Regulations for the Bachelor's and Master's degree programmes at the Faculty of Engineering of FAU (**ABMPO/TechFak**) from 18 September 2007.

Section 35 Standard Duration of Studies, ECTS Credits, Programme Start

(1) ¹120 ECTS credits shall be required in order to pass the Elite Master's degree programme in Advanced Signal Processing & Communications Engineering. ²The standard duration of study shall be four semesters. ³The Master's degree programme may only be started in the winter semester.

(2) The provisions in Section 30 (3)(2) **ABMPO/TechFak** do not apply to related degree programmes.

Section 36 Degree

¹The student is conferred the degree Master of Science (abbreviated MSc) after passing the Master's examination. ²The degree may also be used with the addition '(FAU Erlangen-Nürnberg)'.¹

Section 37 Teaching and Examination Language

¹Notwithstanding Section 4 (5)(1) **ABMPO/TechFak**, the teaching and examination language in the Elite Master's degree programme in Advanced Signal Processing and Communications Engineering (ASC) is English. ²Individual courses and examinations may be conducted in German. ³The Master's thesis shall be written in English; the Examinations Committee shall decide on any exceptions at the student's request. ⁴The degree certificate and final academic record shall be issued in German and English.

Section 38 Admissions Committee

(1) ¹An Admissions Committee shall be established pursuant to Section 11 (2) **ABMPO/TechFak** for the purpose of admitting qualified students. ²The Admissions Committee shall appoint a Selection Committee consisting of at least six university lecturers and three full-time research associates. ³The members of the Selection Committee shall conduct the selection interviews with applicants and report back to the Admissions Committee. ⁴The Admissions Committee shall make the final decision on which applicants are to be granted admission.

(2) The Admissions Committee shall be responsible for the review of qualification and admission requirements for the Elite Master's degree programme according to Section 39.

Section 39 Qualification for the Elite Master's Degree Programme

(1) The qualification requirements for the Master's degree programme shall be a degree that meets the requirements specified in Section 29 (1)(1) **ABMPO/TechFak** in

electrical engineering, computer science or applied mathematics with an above-average final grade and passing the qualification assessment process according to **Appendix 2**.

(2) ¹Additional proof that must be submitted as stipulated in Section 2 (4)(3) in the **Appendix to ABMPO/TechFak** shall be proof of English language proficiency at level B2 of the Common European Framework of Reference for Languages. ²The following shall be accepted as proof of English language proficiency: Abitur (university entrance qualification) certificate, subject-specific university entrance qualification for engineering (fachgebundene Hochschulreife in Fachrichtung Technik; FOS-13 or BOS) or comparable certificates at the level of UNiCert II or Common European Framework of Reference for Languages B2; applicants who completed their university entrance qualification or first degree in English shall not be required to provide proof of English language proficiency.

Section 40 Structure of the Elite Master's Degree Programme

(1) ¹The Elite Master's degree programme shall comprise 13 modules as listed in **Appendix 1a**. ²The structure of the degree programme shall be recorded in an individual study plan for each student according to Section 41 and shall be approved by a mentor who is an ASC professor. ³The final decision on the study plan is made by the Admissions Committee.

(2) ¹Due to the specific subject knowledge that must be acquired as part of the qualification goals of the Master's degree programme, as detailed in the module descriptions, modules that have been completed in a previous Bachelor's degree programme may not generally be accredited for the Master's examination. ²If compulsory modules have already been completed during the Bachelor's degree programme, modules from the catalogue of technical mandatory elective modules shall be chosen in their place.

Section 41 Study Plan

¹Students shall submit a study plan for the coming semester approved by their mentor to the ASC office at the latest two weeks after the start of the lecture period in each semester. ²The study plan shall document the modules to be taken in the current semester and, if applicable, the progress and achievements made in past semesters. ³Care shall be taken when entering research projects and the Master's thesis in the study plan to ensure that the summary of the topic and the names of supervisors make it clear that they deal with different topics pursuant to Section 43 (3). ⁴Changes to a student's study plan must be recommended by the mentor and subsequently receive final approval from the Admissions Committee.

Section 42 Examination and Course Achievements

¹The examination and course achievements serve to prove that students possess the required expertise to successfully complete a module. ²The nature and the extent of the examination and course achievements are shown in the study plan in **Appendices 1a and 1b**.

Section 43 Research Projects

(1) ¹The (major) research project (M8) and (minor) research project pursuant to **Appendix 1b**, if chosen, shall be determined by the student in consultation with their supervisors on the basis of a project plan and approved by the mentor before they are

commenced. ²All full-time university lecturers at the chairs and research units run by ASC professors are eligible to act as supervisors.

(2) ¹The project plan for the research projects must detail which compulsory elective and elective courses are to be included and which additional forms of learning and work (directed reading, presentations, software or hardware projects, reports) are also planned as part of the research project, stating the number of hours allocated to each. ²The planned workload must meet the ECTS requirements for 450 (major) and 300 hours (minor).

(3) ¹The two research projects shall be chosen with the goal of receiving a broad education in two areas with different topics. ²The Degree Programme Committee shall issue guidelines on what constitutes a significant distinction between topics.

Section 44 Admission to the Master's Thesis

(1) Students shall successfully complete modules worth a minimum of 75 ECTS credits to gain admission to the Master's thesis.

(2) ¹In justified, exceptional cases, the Examinations Committee shall be entitled to grant admission to the Master's thesis early. ²Any missing documents shall be submitted during the period for thesis work.

Section 45 Master's Thesis

¹The Master's thesis is intended to demonstrate students' ability to solve problems independently in a relevant current area of research. ²The thesis shall have a workload of approximately 900 hours to be completed within six months. ³The Master's thesis project shall include at least one presentation followed by a discussion on the results of the Master's thesis; the date of the final presentation shall be determined by the thesis supervisor.

Section 46 Evaluation of Achievements for the Master's Degree Programme, Resit Examinations

(1) The Master's degree programme shall be passed once all modules of the module groups M1 - M14 have been passed.

(2) ¹The overall grade for the Master's degree programme is calculated from the grades for modules M1 to M7, M9, M10 and M12 to M14. ²The module grades shall be weighted according to the modules' ECTS credits.

(3) Notwithstanding Section 33 in conjunction with Section 28 **ABMPO/TechFak**, the examination achievements in modules M1 to M7 can be repeated twice; the examination achievements in modules M9, M10 and M12 to M14 can be repeated once.

Part 2: Final Provisions

Section 47 Legal Validity and Transitory Provisions

(1) ¹These degree programme and examination regulations shall come into effect on the day after their publication. ²They shall apply to all students who start the Elite Master's degree programme in Advanced Signal Processing & Communications Engineering (ASC) in winter semester 2016/2017 or later.

(2) ¹The first amendment statute shall come into effect on the day after its publication. ²It shall apply to all students starting a degree programme from winter semester 2019/2020 onwards.

(3) ¹The second amendment statute shall come into effect on the day after its publication. ²It shall apply to all students starting a degree programme from winter semester 2020/2021 onwards. ³Examinations according to the previously valid degree programme and examination regulations shall be offered for the last time in summer semester 2023. ⁴From the date stated in sentence 3, those students who are affected by the examination regulations becoming invalid shall take their examinations in accordance with the currently valid version of the degree programme and examination regulations.

(4) ¹The third amendment statute shall come into effect on 1 October 2021. ²It shall apply to all students starting a degree programme from winter semester 2021/2022 onwards. ³Examinations according to the previously valid degree programme and examination regulations shall be offered for the last time in summer semester 2024. ⁴From the date stated in sentence 3, those students who are affected by the examination regulations becoming invalid shall take their examinations in accordance with the currently valid version of the degree programme and examination regulations.

Appendix 1a: Study Plan for the Master's Degree Programme ASC

Module group			Modules Name	Distribution of ECTS credits				Type and scope of the course and examination achievement
No.	Name	ECTS credits		1	2	3	4	
	Compulsory modules	50		22.5	12.5	15		
1		5	Mathematical optimization in communications and signal processing	5				EA: W90 min
2		5	Information theory and coding	5				EA: W90 min
3		5	Statistical signal processing	5				EA: W90 min
4		5	Machine learning in signal processing	5				EA: W90 min
5		5	Deep learning		5			EA: W90 min
6		2.5	Game theory with applications to information engineering		2.5			EA: W60 min
7		2.5	Selected Topics in ASC		2.5			EA: W90 min ¹
8		5	Kick-off Seminar, Winter & Summer School	2.5	2.5			CA: Seminar achievement
9		15	Research project (Major)			15		EA: (O30 min) + EA (seminar achievement) ³
	Compulsory elective modules	20		2.5	15	2.5		
10		15	Technical mandatory electives		15			EA: see Appendix 1b
11		5	Technical lab courses	2.5		2.5		CA: see module handbook ²
	Elective modules	20		5		15		
12		5	Non-technical electives from the entire range of modules offered at FAU	5				EA: according to module specifications ²
13		15	Technical electives			15		EA: see module handbook ²
	Master's thesis	30					30	
14		30	Master's thesis				30	EA: Thesis and presentations (total 50 min)
	Total	120		30	27.5	32.5	30	
Semester hours per week: 80-100				Total ECTS credits			120	

¹ The type and scope of the examination achievement depend on the specific manner in which the teaching unit chosen by the student in the respective seminar is taught, see module handbook for details. An examination achievement generally consists of a 90-minute written examination or an oral examination lasting 30 minutes.

² The type and scope of the examination achievement depend on the specific manner in which the teaching unit chosen by the student in the respective seminar is taught, see module handbook for details.

³ Seminar achievement pursuant to Section 6 (3) **ABMPO/TechFak**.

Abbreviations used:

EA = examination achievement,

CA = course achievement,

W90 min = 90-minute written examination or an oral examination lasting 30 minutes,

O30 min: 30-minute oral examination.

Appendix 1b: Catalogue of Technical Mandatory Electives for Master's Degree Programme ASC¹

Module name	Semester plan		Type and scope of the course and examination achievement
	WS	SS	
Convex optimization	5		EA: W90 min ²
Image and video compression		5	EA: (see FPO CME)
MIMO communications		5	EA: W90 min ²
Speech and audio signal processing		5	EA: (see FPO CME)
Research project (minor)	10		EA: (O30 min) + EA (seminar achievement) ³

¹ The catalogue may be expanded; see the module handbook for more information.

² The type and scope of the examination depend on the specific manner in which the chosen module is taught in the respective semester and are stipulated in the module handbook. Possible examination achievements per module are: written examination (60 min, 90 min or 120 min), oral examination (30 min) or EA (O30 min) + EA (seminar achievement pursuant to Section 6 (3) **ABMPO/TechFak**).

³ Seminar achievement pursuant to Section 6 (3) **ABMPO/TechFak**.

Abbreviations used:

EA = examination achievement,

W90 min = 90-minute written examination.

Appendix 2: Qualification Assessment Process

(1) ¹The following must be included in applications for admission to the Master's degree programme and submitted to the Admissions Committee:

1. A certificate according to Section 29 (1)(1) **ABMPO/TechFak** in conjunction with Section 39 (1) with a final grade of 2.0 or better.
2. An English CV with a recent photograph, including information on previous school and university education and, if applicable, professional experience, as well as proof of any relevant work experience or internships that are clearly related to topics in the Master's degree programme.
3. An application form completed in English.
4. If university entrance qualification or first degree were not completed in English: proof of English language proficiency equivalent at least to level B2 of the Common European Framework of Reference for Languages.

²If 1. applies, the Admissions Committee can set a deadline for documents to be submitted at a later date.

(2) ¹Applications shall be submitted so as to arrive at the office responsible for the degree programme by 15 March (for foreign applicants) and by 15 July (for German applicants). ²The Admissions Committee may grant an extension of this deadline upon request.

(3) ¹Applicants with a degree as defined in Section 29 (1)(1) **ABMPO/TechFak** in conjunction with Section 39 (1) or in the case of Section 29 (3) **ABMPO/TechFak** with an average grade of 2.0 (=gut, good) or better in their achievements to date shall be invited to an interview lasting at least 20 minutes, which may also be conducted as a video conference. ²The interview shall be conducted by at least one member of the Selection Committee. ³In the interview, the applicant shall outline their qualifications and previous papers on subjects relevant to the degree programme and answer questions regarding their papers and topics relevant to the Elite degree programme at an appropriate level. ⁴The applicant's qualification for the Elite degree programme will be assessed based on:

1. Quality of basic knowledge in the areas of signals and systems, digital signal processing, and digital communications (weighting: 40 %).
2. Quality of basic knowledge acquired during the Bachelor's degree programme that forms the basis for specialization in the topics of an eligible study plan (weighting: 45 %).
3. A positive prognosis demonstrated by the applicant's academic progress in the modules qualifying them for entry to the Master's degree programme; discussion of results from the applicant's previous degree (in particular from the transcript of records) (weighting: 15 %).

(4) ¹The Admissions Committee shall notify applicants of the result of the qualification assessment process. ²A rejection notification shall include reasons and information on the legal remedies available. ³It will not be possible to repeat the qualification assessment process on the basis of the documentation submitted with the first application.

(5) ¹The qualification assessment process shall be adjusted to take into account the nature and extent of a student's disability. ²Students with a doctor's certificate showing credibly that they are either partially or fully incapable of sitting the examination in the intended manner due to long-term or permanent disabilities which do not affect the

performance which is being tested shall be entitled to be granted permission by the chairperson of the Admissions Committee to have this disadvantage offset by working time being extended accordingly or the examination process being structured differently. However, care must be taken to ensure that the examination is still suitable to provide evidence of skills which are being assessed by the examination.