ASIIN Seal

Accreditation Report

Master's Degree Programme
Cartography

Provided by
Technical University of Dresden
Technical University of Munich
Technical University of Vienna
University of Twente

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A About the Accreditation Process

Name of the degree programme (in original language)	(Official) English translation of the name	Labels applied for [1]	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC)[2]
Ma Cartography		ASIIN; European Approach	--	TC 11
Date of the contract: 2020-12-14 **Submission of the final version of the self-assessment report:** 21-02-16 **Date of the visit:** 2021-04-27 **at: online**				
Peer panel: Dipl.-Ing. Torsten Hentschel, Survey Engineer Johann Janssen (Student), University of Hannover; Prof. Dr. Wolfgang Kainz, University of Vienna; Prof. Dr. Jochen Schiewe, Hafen City University Hamburg				
Representative of the ASIIN headquarter: Dr. Michael Meyer				
Responsible decision-making committee: Accreditation Commission for Degree Programmes				
Criteria used: European Standards and Guidelines as of 15.05.2015 ASIIN General Criteria as of 28.03.2014 Subject-Specific Criteria of Technical Committee 11 – Geoscience as of 28.09.2012 European Approach for Quality Assurance of Joint Programmes as of May 2015				

[1] ASIIN Seal for degree programmes;
[2] TC: Technical Committee for the following subject areas: TC 11 - Geosciences

B Characteristics of the Degree Programme

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF[3]	d) Mode of Study	e) Double/Joint Degree	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
Cartography	M.Sc.		Level 7	Full time	Joint Degree with TU Dresden, TU Munich, TU Vienna, U Twente	4 Semester	120 ECTS	Autumn; 2011

For the master's degree programme the institutions have presented the following profile in the diploma supplement:

Through the cooperation of four universities, students acquire in-depth expertise in the entire field of cartography. They gain fundamental knowledge in spatial data modelling, analysis and visualisation of geographic information. Students will be able to use modern theories, methods and procedures relating to map production and map use in the sense of modern cartography including geoinformatics. They participate in research projects and are able to apply the acquired knowledge professionally and economically.

The students will have the ability to capture, model, manage, analyse and visualise adequate spatial data with space, time and attribute information. They will be in the position to handle databases and geographic information systems competently and to accomplish adequate graphic data processing for all kinds of user groups. Students will be able to use all forms of publications and media such as print or multimedia electronic media including web-publishing. Students will critically face up to social connecting factors and implications of various techniques and methods for processing and visualisation spatial data.

Furthermore, students will be in a position to influence and shape cartography strongly as an independent science with its own research and fount of knowledge, but also with an awareness of its distinct/ direct relations to the earth, information and communication sciences, having attained skills for the systematic analysis and synthesis relating the individual to the whole.

[3] EQF = The European Qualifications Framework for lifelong learning

Finally, students will develop their study, research, working and management skills. In all modules communication skills are trained by oral and written communication.

C Peer Report for the ASIIN Seal[4]

Preliminary remark about the European Approach

As the universities involved in the programme apply for the ASIIN seal and the European Approach, the requirements of the European Approach are taken into account as well as the ASIIN criteria for the assessment of the programme. The report of the peers includes their assessments based on both sets of criteria. The report is structured following the ASIIN criteria and the requirements of the European Approach are reviewed within the corresponding chapters.

1. The Degree Programme: Concept, content & implementation

The master's degree programme has been offered by the Technical Universities of Dresden, Munich and Vienna as a joint degree programme since 2011. In a cooperation agreement the universities defined their duties and rights, the structure of the programme, common panels for the administration of the programme and regulations for the admission of students. In 2014, the University of Twente joined the programme by offering several elective modules and the opportunity to write the final thesis in Enschede. After the accreditation of the programme, University of Twente plans to take part in the cooperation agreement formally.

The peers confirm that all four universities involved in the programme are legally recognised as higher education institutions by the responsible governmental institution of their home country. Furthermore, they confirm that the cooperation agreement covers the denomination of the programme's degree, the coordination and responsibilities of participating universities regarding financial organisation, the admission and selection procedure, the mobility of the students and the examination regulations. The peers assess that the programme matches with the requirements 1.1-1.3 of the European Approach.

[4] This part of the report applies also for the assessment for the European subject-specific labels. After the conclusion of the procedure, the stated requirements and/or recommendations and the deadlines are equally valid for the ASIIN seal as well as for the sought subject-specific label.

Criterion 1.1 Objectives and learning outcomes of a degree programme (intended qualifications profile)

Evidence:

- Academic Handbook
- Self-Assessment Report
- Discussions with programme coordinators and representatives of the labour market

Preliminary assessment and analysis of the peers:
The study aims and intended learning outcomes of the programme defined by the universities in correspondence with level 7 of the European Qualifications Framework. Learning outcomes are accessible to students, staff members, and all interested stakeholders through the programme's website.

These objectives were defined in the steering committee established for the programme, which includes representatives of all participating universities. Before the study aims were concluded, the supervisory committee composed of associated partners from industry, including some of the largest companies related to cartography, discussed the profile of the programme and gave advice to the steering committee. Additionally, the orientation of the programme was discussed with cooperating partners in research activities like Gent University, ETH Zuerich, Fraunhofer Institute, German Aerospace Centre or Leibnitz Institute.

From the point of view of the peers, the current profile of the programme takes into account all modern aspects of the field even though cartography is a continuous changing discipline. The study aims not only focus on a wide range of sectoral aspects but also take into account personal competences of the students. Therefore, the peers easily comprehend that graduates are working in quite different fields as researchers, consultants, product managers, cartographic designers, GIS experts, project managers, data analysts and scientists, web designers and software developers.

Given the defined profile, the peers expect excellent chances for graduates on the job market. This expectation is confirmed by the data collected out of alumni surveys. 95% of the graduates are currently employed, either in public and private sector or in academic institutions. Up to now, 11 graduates started their PhD research after finishing the master's degree programme.

As the programme is the only master's programme in cartography offered in Germany by universities, the peers really appreciate the implementation of the programme.

Regarding the European Approach, the peers confirm that the objectives of the programme coincide with the Framework for Qualifications in the European Higher Education Area as well as with the national qualification frameworks. The aims comprise knowledge, skills and competences in the field of cartography.

Criterion 1.2 Name of the degree programme

Evidence:

- Website of the degree programmes
- Self-Assessment Report

Preliminary assessment and analysis of the peers:
The name of the programme is published on the subject-specific webpage and in the examination regulations. The panel confirms that the name of the programme reflects the intended aims and learning outcomes completely.

Criterion 1.3 Curriculum

Evidence:

- The examination regulations and the cooperation agreement define the curriculum and the single modules.
- The module descriptions inform about the aims and content of the single modules.
- Discussions with programme coordinators, lecturers, students

Preliminary assessment and analysis of the peers:
The programme starts at the Technical University of Munich with the mandatory modules Cartographic Foundations, Geoinformation, Geovisualization and Geostatistics and Introduction to Photogrammetry, Remote Sensing and Image Processing. Additionally, students choose two elective courses with at least 8 ECTS-Points. With these modules, the heterogeneous pre-knowledge of the students should be harmonised especially regarding mathematics and design principles of cartography. Furthermore, students learn how geodata can be handled and gather knowledge of acquisition methods for geospatial data.

During the second semester at the Technical University of Vienna, students have to pass four mandatory courses (Cartographic Theories and Applications, LBS and Multimedia Cartography, Cartography Publishing and Applied Cartographic Research and Development). During the second semester the focus lies on the digital visualisation of geodata. In this semester students also have to pass a mapping project.

The third semester offered at the Technical University of Dresden comprises only elective courses such as Georelief and Cartography, Spatial Decision Support System, Mobile Cartography, Remote-Sensing based Mapping, Geodata Infrastructures, Laser Scanning and Digital Terrain Model Generation or Virtual Landscapes. The elective course Principles of Databases is offered online by the University of Twente.

Via the elective courses, students can set individual specialisations in geodata management, software application and programming, 3D terrain presentation or virtual mobility. Within the fourth semester, students write their final thesis at one of the participating universities.

The peers find an overall very well structured programme which implements the intended programme objectives in a very good manner. The intended wide range of aspects regarding cartography is reflected in the modules. The programme clearly benefits from the combined modules of the participating four universities. Each university can offer modules concentrated on their core strength in research and teaching. The combination of the modules covers the whole range of cartographic topics.

One challenge for the programme are the heterogeneous entrance qualifications of the students. The panel learned that during the first weeks of the modules at TU Munich a harmonisation of the student's knowledge takes place before deepening the foundations of cartography. They appreciate this approach as an adequate didactical concept, which seems to be very efficient.

Regarding programming abilities, the peers learned about some issues out of their discussion with students. As the overall programming abilities of students got better over the last years, the former programming course in the first semester was replaced by tutorials. Therefore, students without any technical background seem to have some difficulties with the programming applications in the second semester; and even in the third semester lecturers mentioned very different programming abilities of the students. In order to facilitate the studies for students, the peers adviceto give a basic overview about programming in the first semester at least for students without any technical background. The overview could be focused on one programming language, which could then be applied in the following semesters.

As the peers learned in the discussion with the teaching staff, around half of the modules are also used in other study programmes of the universities as well. To combine students from different study programmes works very well in most cases. Only for the photogrammetry and image processing modules the panel learned about some difficulties out of the discussion with students. Both modules are designed for geodesy or geoinformation programmes and the content is focused on the needs of these programmes. Therefore, in both

modules topics are handled in an intensive way, which would not be needed for cartography but creates problems for the students in the programme under review to pass the requirements in these modules. The peers comprehend that photogrammetry and image processing includes useful aspects for cartographic applications but they recommend to offer both topics more oriented on the needs of the master programme in cartography.

Nevertheless, overall the peers conclude that the curriculum implements the intended learning outcomes in a very good manner. A wide range of topics is included in the curricula and the content of the programme is linked to the current subject-specific international research discussions.

Therefore, the programme also matches the requirements of the European Approach regarding the curriculum.

Criterion 1.4 Admission requirements

Evidence:

- Examination regulations
- Cooperation agreement
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The consortium of the universities has established a central application procedure, which is defined in the examination regulations and the cooperation agreement. Responsible for the selection of applicants is the selection board, which consistsof representatives of the participating universities.

The admission procedure is divided into two steps. First, there is a general eligibility check based on the submitted documents by the applicants. These documents include, among others, a motivation letter. The second part consists of a review of all qualification requirements by the selection board.

The universities requires a Bachelor's degree with at least 180 ECTS-Points in the fields of cartography, geoinformatic, geoinformation, geodesy, survey, geosciences, environmental sciences, computer science, geography or similar programmes. Additionally, applicants have to prove sufficient language skills in English.

Applicants may also apply for an Erasmus-Mundus scholarship. Corresponding to the criteria for these scholarships only three students out of the same country are allowed to be enrolled in one year.

The admission of the selected applicants is in the responsibility of the TU Munich. Students are enrolled at TU Munich for their complete studies. Nevertheless, they also have total access to the student services and support systems at the other universities during their stay.

The auditors find the terms of admission to be binding and transparent. They confirm that the admission procedure enables the universities to select the most qualified students. An admission under requirements to make up missing admission requirements is defined but not in use yet as there were sufficient qualified applicants up to now.

The peers confirm furthermore that the admission requirements and the selection procedure is appropriate in light of the programme's level and discipline as mentioned in the European Approach.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 1:

As the universities dispense with any comments, the panel confirms its preliminary assessment. The criterion is completely fulfilled.

Nevertheless, the peers recommend to give a basic overview about programming in the first semester at least for students without any technical background. The overview should be focused on one programming language, which could be applied in the following semesters.

2. The degree programme: structures, methods and implementation

Criterion 2.1 Structure and modules

Evidence:

- Self-Assessment Report
- Study plan of the degree programme
- Module descriptions
- Discussions with programme coordinators, teaching staff and students

Preliminary assessment and analysis of the peers:

The structure of the programme under review is clearly outlined on the subject-specific website. The programme consists of modules, which comprise a sum of teaching and learning. The module descriptions are also published on the subject-specific website. Based on

the analysis of the sequence of modules and the respective module descriptions the peers concluded that the structure ensures that the learning outcomes can be reached by the students. The programme also offers several elective courses, which allow students to define an individual focus. Based on the analysis of the curriculum and the module descriptions the peers confirmed that the objectives of the modules and their respective content help to reach both the qualification level and the overall intended learning outcomes.

As nearly all students come from foreign countries, the universities do not define a specific way to study abroad. Nevertheless, they define rules for the recognition of credits awarded to students externally corresponding to the Lisbon Recognition Convention.

Criterion 2.2 Work load and credits

Evidence:

- Self-Assessment Report
- Study plan of the degree programme
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the peers:
As a credit point system, the universities use ECTS which is based on the complete student workload during contact hours at the universities and self-study periods. The overall workload in the programme are equivalent to 120 ECTS-Point in four semesters. Each Semester includes 30 ECTS-Points.

Compared to the objectives and the content, the workload defined for the individual modules seems to be realistic for the peers and they see that structure-related peaks in the workload have been avoided. The students confirme this impression in general.

Although from the student point of view the workload for the modules is realistic, the change after the first semester from Munich to Vienna seems to be hard for them. Due to the different scheduled semesters in Germany and Austria, the courses in Vienna start nearly immediately after the end of the semester in Munich. As most foreign students are not familiar with the German examination system (see chapter 3) it feels very challenging for them to start a complex project directly after a intensive period of examination. Additionally, the students mentioned that the project work in Vienna is really compressed during the short summer semester.

The peers could comprehend the indication of the students but do not see any problems to finish the programme in time as the vast majority of the students do so. In case students extend their study time it is done out of personal reasons, e.g. if they want to do a voluntary

internship. The generally adequate workload is also confirmed by the high success rate of the programme. Out of 156 beginners since the start of the programme only six students left the programme without graduation.

The peers appreciate that the student workload is evaluated regularly in the teaching evaluation process.

In conclusion, the peers confirm that the workload of the programme with 120 ECTS-Points in four semesters is in accordance with the European Approach for Master's degree programmes and that the workload is monitored regularly.

Criterion 2.3 Teaching methodology

Evidence:

- Self-Assessment Report
- Study plan of the degree programme
- Module descriptions

Preliminary assessment and analysis of the peers:
In the programme various teaching and learning methods such as lectures, exercises, computer labs and projects are utilized. Group work is integrated in nearly half of the modules. The peers appreciate that a distinct student-oriented learning and teaching system is established especially with the project in the second semester and the integrated group work.

The peers concluded, also with reference to the remarks of the students, that the teaching methods and instruments used support the students in achieving the learning outcomes.

The peers confirm that the learning and teaching approaches applied are adequate to achieve the intended learning outcomes as required by the European Approach.

Criterion 2.4 Support and assistance

Evidence:

- Self-Assessment Report
- Discussion with programme coordinators and students

Preliminary assessment and analysis of the peers:
Students of the programme under review have full access to all student services and advisory systems of the participating universities. Additionally, the universities provide special support to these students ranging from administrative assistance (e.g., visa and resident permit), welcome service, individual and intensive supervision and student guidance to ac-

commodation support. At each university involved in the programme, a local mentor advises students regarding all upcoming questions. Detailed information about the programme, the organisation, requirements for application, support opportunities, etc. are published in the programme flyer, application guidelines, student agreement, student handbook and module handbook.

The peers are impressed by the distinct supporting system established by the universities, which is explicit praised by the students. The students assess the supporting system as extremely helpful regarding the challenging alternation of universities each semester. Starting from helping with visa application to accommodation and all administrative issues, students are very satisfied with the support of the universities.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 2:

As the universities dispense with any comments, the panel confirms its preliminary assessment including the recommendation to offer Photogrammetry and image processing more oriented on cartographic aspects.

The criterion is completely fulfilled.

3. Exams: System, concept and organisation

Criterion 3 Exams: System, concept and organisation

Evidence:

- Self-Assessment Report
- Module descriptions
- Examination regulations
- Discussion with programme coordinators, teaching staff and students

Preliminary assessment and analysis of the peers:

Examinations take place immediately after completion of the individual modules. This means that all module examinations are conducted at the end of the respective semester. The consortium of the participating universities has agreed to apply common examination rules, which are fixed in the examination regulations. The exam results obtained at each partner university are recognised by all other partners.

For the assessment of the students written exams, reports, presentations or seminar participations are in use. Each module is assigned a coordinator and examined as well as evaluated by two teaching staff members, who are authorized examiners.

The host university of each semester is responsible for collecting and transmitting the assessment records of all students to the other partner universities. TU Munich records all exam results of a student after each semester. Students receive an up-to-date copy of the joint transcript of the completed courses after each semester.

If it is not possible to repeat failed exams within the same semester, the participating universities arrange remote repeat examinations. These are held in the following semester at the university the student has moved to. The local coordinator ensures the administration of the exam in a timely manner and returns the completed written exam to the university where the failed exam took place.

After finishing the master's thesis students are required to give a presentation of the final thesis, which is jointly evaluated by a thesis assessment board. The supervisor and co-supervisor/reviewer have to be from two partner universities.

TU Munich prepares the joint degree together with a joint transcript of records and a joint diploma supplement. All successful students are awarded the same joint degree "Master of Science in Cartography".

From the point of view of the peers, the examination administration is structured very well. They appreciate that the administration is concentrated at one responsible university. Out of the discussion with the students, they learned that the timing of exams is well coordinated at all universities.

Besides the final exams in several modules, additional tests are included as well. These tests are not mandatory but are a supporting preparation for the final exams and students are recommended to take part.

The students prefer the Austrian examination regulation, which allows smaller exams than the German national system. Most of the foreign students come from examination systems with several smaller exams for each course like mid-terms. Therefore, the German system with extensive module exams at the end of semester is assessed as really challenging by the students. They would clearly prefer more yet smaller exams.

The auditors comprehend the indication of the students but from their point of view both the exam load and the preparation times are adequate.

In summary, the auditors confirm that exams are module-related and are focused on assessing whether students reach the intended learning outcomes of the respective module.

The administrative organisation of exams avoids any delays to student progression caused by deadlines, exam correction times or re-sits.

This examination regulation correspond also with the requirements of the European Approach regarding assessment of students.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 3:

As the universities dispense with any comments, the panel confirms its preliminary assessment. The criterion is completely fulfilled.

4. Resources

Criterion 4.1 Staff

Evidence:

- Self-Assessment Report
- Staff handbook
- Discussions with programme coordinators and teaching staff

Preliminary assessment and analysis of the peers:
In the programme under review, four worldwide renowned cartographic institutes – one at each university – are involved. Each institute is led by a professor, including additional academic staff.

For the administration of the programme, the participating universities defined several boards and committees within the cooperation agreement. The steering committee is in charge of all academic matters like content of the course components, advising master's thesis but also the selection of scholarship recipients. The administrative centre provides administrative support and manages all administrative questions and problems. An evaluation committee examines and analyses the entire evaluation process of the programme. The selection board is responsible for the student selection procedure. The examination committee deals with all questions regarding exams. For the assessment of the theses, the universities has established another board. Finally, a supervisory board gives recommendations to the steering committee for the further development of the programme. All boards and committees are composed of members of the participating universities and in some cases additional external members and students. The peers appreciate this distinct administrative structure, which ensures a well-organised settlement of the programme.

The reviewers see that the universities and institutes participating in the programme are connected excellently to national and international research networks and governmental institutions related to cartography. The distinct research activities, composition, scientific orientation and qualification of the teaching staff perfectly match with the intended learning outcomes and content of the programme. The quantity of the teaching staff ensures not only the implementation of the lectures but also the aforementioned outstanding supporting and advisory system.

The composition of the teaching staff corresponds with the requirements of the European Approach as well.

Criterion 4.2 Staff development

Evidence:

- Self-Assessment Report
- Discussions with programme coordinators and teaching staff

Preliminary assessment and analysis of the peers:
There are offers and support mechanisms available for teaching staff who wish to further develop their teaching skills at each participating university. All universities also support the research activities of the teaching staff in different ways like sabbaticals or reducing the teaching load.

Criterion 4.3 Funds and equipment

Evidence:

- Self-Assessment Report
- Discussions with programme coordinators and teaching staff
- digital visit of the laboratories, lecture rooms

Preliminary assessment and analysis of the peers:
Within the cooperation agreement, the participating universities commit to finance their own courses offered in the programme and to ensure access to their facilities. Additional costs of the programme are financed by the scholarships of the students.

The peers are convinced that the financial means were sufficient and secured for the timeframe of the accreditation. The equipment of the labs ensures the implementation of the programme.

The auditors confirm that the financial resources and the facilities are sufficient and adequate in view of the intended learning outcomes as required by the European Approach.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 4:

As the universities dispense with any comments, the panel confirms its preliminary assessment. The criterion is completely fulfilled.

5. Transparency and documentation

Criterion 5.1 Module descriptions

Evidence:

- Self-Assessment Report
- Module descriptions

Preliminary assessment and analysis of the peers:
The students, as well as all other stakeholders, have access to the module descriptions via the website of the programme.

After reviewing the module descriptions, the peers confirm that they include all necessary information about the persons responsible for each module, the teaching methods and workload, the awarded credit points, the intended learning outcomes, the content, the admission and examination requirements and the forms of assessment.

Criterion 5.2 Diploma and Diploma Supplement

- Self-Assessment Report
- Sample Diploma Supplement

Preliminary assessment and analysis of the peers:
The auditors confirm that the students are awarded a Diploma and a Diploma Supplement after graduation. The Diploma Supplement contains all necessary information about the degree programme in order to give third parties an adequate overview about the profile and qualifications of graduates.

Criterion 5.3 Relevant rules

Evidence:

- Self-Assessment Report
- All relevant regulations are published on the programmes website
- Cooperation agreement of the participating universities

Preliminary assessment and analysis of the peers:
The auditors confirm that the rights and duties of both the universities and the students are clearly defined and binding. All rules and regulations are published on the universityies websites and hence are available to all relevant stakeholders. In addition, the students receive all relevant course material in the language of the degree programme at the beginning of each semester.

Additionally, the cooperation agreement defines the all specifications of the programme and the duties and responsibilities of the institutions involved.

Overall the peers confirm that all relevant information regarding the programme such as admission requirements and procedures, course catalogue, examination and assessment procedures, etc. are well documented and published as required for the European Approach regarding transparency.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 5:

As the universities dispense with any comments, the panel confirms its preliminary assessment. The criterion is completely fulfilled.

6. Quality management: quality assessment and development

Criterion 6 Quality management: quality assessment and development

Evidence:

- Self-Assessment Report
- Cooperation agreement
- Evaluation regulation
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The reviewers find a well-structured continuous process in order that aims at improving the quality of the degree programme, which is based upon regular evaluation of the modules by students. Each partner university evaluates all courses taught in the respective semester according to the local quality assurance mechanisms.

The results of the students' surveys are given to the steering committee and the evaluation committee of the programmes. For the discussion of the results in the steering committee representatives of administrators, teaching staff members and students are invited as internal stakeholders.

Besides the evaluation of each module, a questionnaire tailored to the programme is used at the end of each semester to collect student feedback and compare semesters at different universities. Additionally, data about the qualification of applicants, failure rate in modules or number of graduates are collected as indicators of any issues in the programme.

During the audit, the peers learn that the results of the surveys are accessible by the students and the members of the teaching staff. In case of poor evaluation results, the deans discuss opportunities for improvements with the respective lecturer.

The auditors gain the impression that the students' feedback is taken seriously by the institutions and remarks are taken account for the further development of the programme.

In summary, the peer group confirms that the quality management system of the is suitable to identify weaknesses and to improve the degree programme. All stakeholders are involved in the process.

The cooperating institutions apply joint internal quality assurance processes as required for the European Approach.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 6:

As the universities dispense with any comments, the panel confirms its preliminary assessment. The criterion is completely fulfilled.

D Additional Documents

No additional documents needed

E Comment of the Higher Education Institution

The universities involved in the programme dispense with any comments.

F Summary: Peer recommendations

The peers summarize their analysis and **final assessment** for the award of the seals as follows:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Euroean Approach
Ma Cartography	Without requirements	30.09.2026	Without requirements

Recommendations

E 1. (ASIIN 1.3) It is recommended to give a basic overview about programming in the first semester at least for students without any technical background. The overview should be focused on one programming language which could be applied in the following semesters.

E 2. (ASIIN 2.3) It is recommended to offer Photogrammetry and image processing more oriented on cartographic aspects.

G Comment of the Technical Committee 11 - Geosciences

The Technical Committee discusses the procedure and follows the assessment of the peers without any changes.

The Technical Committee 11 – Geosciences recommends the award of the seals as follows:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Euroean Approach
Ma Cartography	Without requirements	30.09.2026	Without requirements

Recommendations

E 3. (ASIIN 1.3) It is recommended to give a basic overview about programming in the first semester at least for students without any technical background. The overview should be focused on one programming language which could be applied in the following semesters.

E 4. (ASIIN 2.3) It is recommended to offer Photogrammetry and image processing more oriented on cartographic aspects.

H Decision of the Accreditation Commission

The Accreditation Commission discusses the procedure and follows the assessments of the peers and the Technical Committee without any changes.

The Accreditation Commission decides to award the applied seal as followed:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Euroean Approach
Ma Cartography	Without requirements	30.09.2026	Without requirements

Additionally, the Accreditation Commission determines that the study programme correspond to the criteria of the EuropeanApproach.

Appendix: Programme Learning Outcomes and Curricula

According to the self assessment report the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Master degree programme:

[…]

CARTO is a research-oriented two-year Master's programme of 120 ECTS, including a thesis of 30 ECTS. Students who successfully complete this programme are qualified to receive a Master of Science Degree in cartography.

Taking the evolving research agenda of the International Cartographic Association (ICA) and its commissions into consideration, all four partner universities have jointly defined the learning contents and the Intended Learning Outcomes (ILOs) for each in- dividual module in the curriculum. The learning contents are deliberately structured to emphasize three characteristics of the programme:

1. Complementarity – The learning contents are embedded in modules that involve two or more participating universities. The ILOs are a much broader perspective on domain-specific knowledge, a critical reflection on the evolving terminologies, theories and methods, an enriched understanding of different case studies, and the abil- ity to assess alternative solutions to the same problem.
2. Uniqueness – The learning contents are embedded in respective modules which highlight the research expertise of one partner university. The ILOs are an in-depth view at selected research topics, a comprehensive understanding of related scientific approaches spanning definition of concepts, identification of bottlenecks, development of methods, prototypical implementations to evaluation of scientific results, and the ability of students to propose their own ideas and independently conduct research or application-oriented experiments to realize the ideas.
3. Interdisciplinarity – The learning contents are embedded in modules that are built upon each other and consecutively involve all four partner universities. The course contents of preliminary modules in a previous semester are re-visited using different pedagogic methods, lab facilities, computational tools for the same and additional application domains. The ILOs are transferable skills of students to work in cross- cultural and interdisciplinary settings, to assume leadership responsibilities related to social, scientific and ethical issues, to conduct collaborative research on

global issues in diverse local contexts, and to communicate their information, conclusions and motivations to both specialist and non-specialist audiences.

The following **curriculum** is presented:

1. Fachsemester an der Technischen Universität München (30 Credits):

Pflichtmodule (insgesamt 22 Credits)**:**						
BV300025	Cartographic Foundations	VI	3	**5**	sch.	90 min
BV300003	Geo-Information	VI	4	**6**	sch.	60 min
BGU30045	Geovisualization and Geostatistics	VI	4	**5**	sch.	120 min
BV480016	Introduction to Photogrammetry, Remote Sensing and Image Processing	2VO+ 2VO 1UE	5	**6**	sch.	120 min
Wahlmodule (es sind mind. 8 Credits zu erbringen):						
BGU30047	Principles of Databases (UT/ITC online module)	VI	3	**5**	sch.	120 min
BGU30048	Spatial Decision Support Systems (UT/ITC online module)	VI	3	**5**	sch.	120 min
IN2026	Scientific Visualization	VI	4	**5**	sch.	60-90 min
BGU30046	Mapping Project	PT	3	**5**	Pr.	
BV030012	Engineering Databases	VO	2	**3**	sch.	60 min
BV570007	Observing and Modelling Global Dynamic Processes	VO	2	**3**	sch.	60 min
BV230050	Atmospheric Physics and Remote Sensing	VO	2	**3**	m.	30 min
SZ0453	English – Scientific Presentation and Writing C2	VO	2	**3**	m.	30 in

2. Fachsemester an der Technischen Universität Wien (30 Credits):

Pflichtmodule (insgesamt 30 Credits)**:**						
BV300027	Cartographic Theories and Applications	VO+ VI	6	**9**	sch. (70%) + Pr. (30%)	120 min
BV300028	LBS and Multimedia Cartography	VI	7	**10**	sch. (30 %) + Pr. (70 %)	120 min
BV300029	Cartographic Publishing	VI	4	**5**	sch.	120 min
BV300030	Applied Cartographic Research and Development	VO+ PT	5	**6**	Pr.	

3. Fach-Semester an der Technischen Universität Dresden (30 Credits):

Wahlmodule (es sind mind. 30 Credits zu erbringen):						
BGU30061	Georelief and Cartography - Morphogenetic and Environmental Understanding	VO+ EX	8	**10**	Pr.	
BGU30047	Principles of Databases (UT/ITC online module)	VI	3	**5**	sch.	120 min
BGU30048	Spatial Decision Support Systems (UT/ITC online module)	VI	3	**5**	sch.	120 min
BGU30059	Mobile Cartography	VO+ UE	5	**10**	sch. (50 %) + Pr. (50 %)	120 min
BGU30058	Subject-specific GIS Applications and Case Studies	VI	5	**10**	m. (50%) + Pr. (50%)	20 min
BGU30057	Remote-Sensing-based Environmental Mapping	VO	2	**5**	m.	20 min
BGU30050	Geodata Infrastructures	VI	3	**5**	sch.	90 min

BGU30051	Laser Scanning and Digital Terrain Model Generation	VI	2	**5**	sch.	90 min
BGU30060	3D Virtual Landscapes	VI	2	**5**	m. (50%) + Pr. (50%)	20 in

4. Fachsemester wahlweise an der Technischen Universität Dresden, der Technischen Universität Wien, der Universität Twente oder an der Technischen Universität München: Master‘s Thesis im Umfang von 30 Credits

BV00MTCA	Master´s Thesis			**30**	Wiss. Aus-arb. (80%) + m. (20%)	