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177. Curriculum for the Master's Degree Programme in Applied Geoinformatics (Curriculum 2025)

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In its session on 18.06.2025 the Academic Senate of the Paris Lodron University of Salzburg enacted the curriculum for the English Master's degree programme Applied Geoinformatics formally approved by the curriculum commission Applied Geoinformatics of the University of Salzburg in its session on 02.06.2025 in the following version.

The legal basis for the curriculum is the Federal Act on the Organisation of Universities and their Studies (Universities Act 2002 – UG), Federal Law Gazette I No. 120/2002, as well as the section of the Statutes of the University of Salzburg pertaining to university studies, in the applicable version.

§ 1 General provisions

(1) The total number of ECTS credit points necessary to complete a degree in the Master's programme in Applied Geoinformatics is 120. This corresponds to four semesters of study.

(2) Graduates of the Master's programme in Applied Geoinformatics will be awarded the academic title "Master of Science", abbreviated "MSc".

(3) The precondition for the admission to the Master's degree programme in Applied Geoinformatics is the completion of a relevant Bachelor's degree programme or of another relevant degree programme of at least the same higher educational level at a recognised domestic or foreign post-secondary institute of education (cf. § 64 para. 3 UG).

(4) To compensate for significant subject-related differences in equivalency the students may be required to complete supplementary examinations worth up to 45 ECTS credit points; these supplementary examinations must be completed by the end of the second semester of the Master's programme. Only the Rectorate or a member of staff of the University of Salzburg designated by the Rectorate is authorised to decide on whether there are significant subject-related differences in equivalency.

(6) The selection of candidates for the Master's programme in Applied Geoinformatics is made based on the application supporting documents. A detailed description of the process can be found in the Annex III: Application procedure.

(7) Students holding a degree in 'BA Geographie' from any university in Austria as well as students from the University of Salzburg holding a BSc degree in Digitization-Innovation-Society (DIG) with the major subject 'Geoinformatik' are unconditionally accepted, subject to the application procedure pursuant to para. 6.

(8) Each academic achievement to be fulfilled by students has been assigned ECTS credit points. One ECTS credit point equals 25 hours of study, which corresponds to the average number of hours required to achieve the expected learning objectives. An academic year consists of 1500 full hours corresponding to 60 ECTS credit points.

(9) Students with disabilities and/or chronic illnesses must not be subject to any form of discrimination in their studies. The guiding principles of the UN Convention on the Rights of Persons with Disabilities, the Austrian Federal Equal Treatment Act as well as the principles of compensation of disadvantage apply.

(10) The Master's programme in Applied Geoinformatics is to be offered fully in English.

§ 2 Subject of the degree programme and qualification profile

(1) Subject of the degree programme

The discipline of Geoinformatics offers highly sought-after qualifications well founded in concepts and technologies of geospatial computing, tied into inter- and multidisciplinary application domains.

The knowledge and skills acquired throughout the programme's modules are based on the common grounding of spatial sciences and a 'Digital Earth' perspective, based on concepts typically acquired during undergraduate Geography, Surveying, Environmental Studies, Cartography or Planning programmes.

The Applied Geoinformatics MSc aims at the building of advanced competences in geospatial data acquisition and data management, data analytics and simulation as well as interactive communication. Graduates are expected to interface with different spatially oriented application domains, contribute to solving problems across societies, economies and environments as well as leading teams assigned pertinent tasks.

The Master's programme in Applied Geoinformatics fosters international experience from students by aligning with the criteria for the upcoming European degree and European Label, in collaboration with other universities.

(2) Professional skills and competences (learning outcomes)

Geoinformatics has been established as a methodology-oriented, cross-disciplinary subject based on spatial concepts and approaches. Such 'spatial view' competences are invaluable within any subject-specific context whilst widely applicable across domains such as planning, resource management, logistics, mobility, marketing, nature and environmental protection, and security.

Graduates with a Master's degree in Applied Geoinformatics are able to answer research questions, including the development of hypotheses, definition of objectives, selection of methods, implementation of workflows, collection, analysis and interpretation of data as well as written and oral communication and interpretation of outcomes in a decision support context.

The study programme provides application-oriented knowledge based on relevant theories and methods. Discipline-specific ways of thinking, analytical skills and techniques as well as problem-solving competences are developed in core areas of Geoinformatics, especially in:

- Geospatial data acquisition
- Geomedia and advanced cartographic communication
- Data modelling and spatial data management Data analytics across the spectrum of Geoinformatics: georeferenced data and data streams; in-situ, remote and mobile sensing; statistics; Spatial Data Science
- GeoAI: Geospatial Artificial Intelligence
- Complex spatial system modeling
- Spatial analysis, as well as dynamic system simulation
- Standards for architectures of open and distributed systems and spatial data infrastructures
- Development of geospatial applications.
- Big Data Analytics and Remote Sensing

Graduates of the Master's degree programme in Applied Geoinformatics are able to work independently on research questions. This includes forming hypotheses, formulating objectives, selecting methods, designing a work program, and collecting, evaluating and analyzing spatial data. Graduates are also able to interpret the results and present them orally and in writing.

(3) Importance and relevance of the degree for the scientific community, society, and the labour market

Graduates of the Master's programme in Applied Geoinformatics develop a focus on methodological and technical areas of expertise, thus emphasizing career perspectives in public administration (e.g. spatial data infrastructures and geoinformatics services and application development, as well as in application domains such as in spatial planning, regional management, mobility, disaster management, safety & security, environment and nature conservation) and in business across a broad spectrum of industries. The study programme covers all areas of geospatial data collection and data management, spatial analytics, communication of results and decision support, interaction with spatial information, as well as aspects of general management. Geospatial Artificial Intelligence (GeoAI) is an interdisciplinary field that can be used to combine geospatial studies with artificial intelligence (AI) technologies and machine learning (ML) to analyze and interpret spatial data. This enables more accurate and efficient solutions for various interdisciplinary geographic and environmental challenges. As part of the degree programme, various course topics are taught in contexts such as sustainability and the climate crisis, democracy education, poverty or migration research as well as sensitivity to important social and ecological challenges and basic skills in dealing with them. Graduates have special career opportunities through compulsory internships and an increased awareness of novel application areas in the emerging Geoinformation and Space (EO*GI) sector.

§ 3 Structure of the programme

The Master’s programme in Applied Geoinformatics comprises 9 modules with a total number of 78 ECTS credit points. In addition, 6 ECTS credit points are assigned for free elective courses and 9 ECTS credit points are assigned to a mandatory internship. The Master’s thesis is worth 24 ECTS credit points, the Master’s thesis colloquium is worth 1 ECTS credit point and the Master’s examination is worth 2 ECTS credit points.

	ECTS
856M21 – Foundations	6
856M22 – GIScience: Theory and Research Methods	6
856M23 – Digital Earth - Core Methods	12
856M24 – Spatial Analysis and Modeling	6
856M25 – Geo-Application Development	12
856M26 – Geospatial Infrastructures & Geoportals	12
856M27 – Interdisciplinary/Integrated/Interactive Project	6
856M28 – Specialization Courses	12
856M29 – Transdisciplinary module for socio-ecological crises	6
Internship	9
Free Elective Courses	6
Master’s Colloquium	1
Master’s Thesis	24
Master’s Examination	2
Total	**120**

§ 4 Types of courses

The programme comprises the following types of courses:

Lecture courses (VO) provide an overview of a subject or one of its sections and its theoretical approaches and present different doctrines and methods. Contents are primarily presented in the style of a speech. A lecture course is not continuously assessed, attendance is not compulsory.

Tutorial courses (UE) aim to help students acquire, practice and perfect practical skills and knowledge of the subject or one of its topics. A tutorial course is a continuous assessment course, attendance is compulsory.

Colloquium courses (KO) serve as a forum for academic discussion, debate and collaboration, the consolidation of specialist knowledge and the specialised supervision of theses, dissertations, and research. A colloquium is a continuous assessment course, attendance is compulsory.
Interdisciplinary project courses (IP) utilise approaches and methods from different disciplines, linking thematic areas and combining theoretical and practical aspects. An interdisciplinary project course is a continuous assessment course, attendance is compulsory.

Introductory seminar courses (PS) are research-oriented courses constituting the pre-stage to seminars. Students actively participate in practical and theoretical work to acquire basic knowledge and skills in academic research. An introductory seminar course is a continuous assessment course, attendance is compulsory.

Seminar courses (SE) are advanced academic courses to acquire more in-depth knowledge, to discuss and reflect academic issues through active participation on the part of the students. A seminar course is a continuous assessment course, attendance is compulsory.
Different focal points of seminar courses are stated in the course description (e.g. supervision seminar, empirical seminar, project seminar, interdisciplinary seminar, …).

§ 5 Programme content and schedule of study

The following contains a list of modules and courses of the Master's programme in Applied Geoinformatics. The attribution to semesters serves as a recommendation designed to ensure that the order in which the courses are taken is optimally built on previous knowledge and that the workload of 60 ECTS credit points within an academic year is not exceeded. However, modules and courses can be taken in a different order if there are no preconditions according to § 12. Students are urged to follow the recommended plan of study, especially regarding the course IP Integrated Project (topics vary), for which students should have completed at least 30 ECTS credit points prior to attendance.

Detailed descriptions of the modules including the knowledge, methods, and skills to be imparted can be found in Annex I: Description of modules.

Master's Degree Programme in Applied Geoinformatics								
Module	**Course**	**SHrs**	**Type**	**ECTS**	**Semester with ECTS**			
					I	**II**	**III**	**IV**
(1) Compulsory Modules								
Module 856M21 - Foundations								
Orientation, Career Development & ePortfolio		1	UE	1	1			
Scientific Methods and Writing		1	PS	2	2			
GI/EO Project Management		2	UE	3		3		
Subtotal for Module 856M21		4		6	3	3		
Module 856M22 - GIScience: Theory and Research Methods								
Geographic Information Science and Technology		2	VO	3	3			
Theory and Concepts of GIScience and Geoinformatics		2	SE	3		3		
Subtotal for Module 856M22		4		6	3	3		
Module 856M23 - Digital Earth - Core Methods								
Advanced Remote Sensing		4	PS	6		6		
Cartographic Design & Geomedia		2	PS	3	3			
Multivariate Statistics | Spatial Statistics		2	UE|PS	3	3			
Subtotal for Module 856M23		8		12	6	6		
Module 856M24 - Spatial Analysis and Modeling								
Methods in Spatial Analysis		2	PS	3	3			
Spatial Analysis and Modeling		2	SE	3		3		
Subtotal for Module 856M24		4		6	3	3		
Module 856M25 - Geo-Application Development								
Basics of Software Development		2	VO	3	3			
Practice: Software Development		2	PS	3	3			
Application Development		3	IP	6		6		
Subtotal for Module 856M25		7		12	6	6		
Module 856M26 - Geospatial Infrastructures & Geoportals								
Design of Geospatial Data Models and Services		2	VO	3	3			
OpenGIS: Standards, Architectures & Services		2	VO	3	3			
SDI Services Implementation		3	IP	6		6		
Subtotal for Module 856M26		7		12	6	6		
Module 856M27 - Interdisciplinary/Integrated/Interactive Project								
Integrated Project (topics vary)		3	IP	6			6	
Subtotal for Module 856M27		3		6			6	
Modul 856M28 - Specialization Courses (select 12 ECTS)								
Geodata Acquisition & Quality Assurance		2	UE	3			3	
Advanced Cartography		2	PS	3			3	
GeoAI: Geospatial Artificial Intelligence		2	PS	3			3	
Spatial Simulation		4	PS	6			6	
Digital Earth: Big Earth Data Concepts		2	PS	3			3	
Spatio-temporal Data Analytics		2	PS	3			3	
Additional options identified by RB[1]								
Subtotal for Module 856M28				12			12	
Module 856M29 - Transdisciplinary module for socio-ecological crises								
Courses to be freely elected from the course catalogue regarding topics relating to socio-ecological crises				6		3		3
Subtotal for Module 856M29				6		3		3
Total for Compulsory Modules				78	27	30	18	3

(2) Free Elective Courses			6	3		3	
(3) Internship			9			9	
(4) Master's Colloquium		KO	1				1
(5) Master's Thesis			24				24
(6) Master's Examination			2				2
Total Sum			120	30	30	30	30

§ 6 Study profile

(1) A study profile allows students to deepen their knowledge and expertise in a specific area.

(2) Certification of study profiles: The study profiles can be documented in the master certificate / final transcript of studies.

(3) The study profile 'Earth Observation (EO)' can be completed by taking courses designated by the responsible body, totalling 30 ECTS credit points, within modules [856M23] to [856M28].

(4) The responsible body can identify and define additional study profiles based on demand and according to the available course offerings. Para. 3 applies accordingly.

§ 7 Free elective courses

(1) In the Master's programme in Applied Geoinformatics students are to complete free elective courses totalling 6 ECTS credit points. These free elective courses can be selected from the range of courses offered by all recognised post-secondary educational institutions without restriction and are designed to further the acquisition of additional professional skills and to strengthen individual areas of focus within a student's course of study.

(2) Recommended areas from which students can choose elective courses comprise:

- Gender Studies
- Geography and Spatial Planning
- Sustainability Studies

§ 8 Master's thesis

(1) The Master's thesis serves to demonstrate that the students have acquired the capability to independently perform academic research in the field of Applied Geoinformatics according to current academic research methods and standards.

(2) The topic of the Master's thesis should be chosen in such a way that it is reasonable and appropriate to complete the thesis within six months (cf. § 81 para. 2 UG).

[1] RB = responsible body

(3) The topic of the Master's thesis must be taken from the modules [856M22] to [856M26] or [856M28] in the Master's programme. The student is entitled to suggest a topic or to choose the topic from a number of topics proposed by the available thesis advisors.

(4) The Master's thesis is worth 24 ECTS credit points.

(5) It is to be noted that both the student's work on the topic and the advisor's work with the student are subject to the Austrian Copyright Act, Federal Law Gazette No. 111/1936 (cf. § 80 para. 2 UG).

(6) Extensive thesis topics jointly researched and developed by more than one student are admissible, if each student's individual contribution and results are well documented and can be separately and independently assessed.

§ 9 Internship

(1) As part of the Master's degree programme in Applied Geoinformatics, students must complete a compulsory internship related to the programme comprising, or equivalent to, 6 weeks of full-time employment (this corresponds to 9 ECTS credit points). The internship should enable students to use the knowledge and skills they have gained during their studies so far.

(2) The internship is generally to be completed outside of the university in institutions pre-approved by the governing body responsible for study matters. Prior to starting work the responsible governing body must be informed of the internship and the selected institution, and both must be approved by the responsible governing body.

(3) Should it not be possible to complete the internship outside the university in justified cases, students may complete an internship by participating in research projects at the university, as far as this is possible at the university and as far as this is approved by the responsible governing body.

(4) Students with disabilities and/or chronic illnesses will be supported by the university as far as internships are concerned. If it is not possible to obtain an internship at possible institutions due to inadequate infrastructure (physical as well as infrastructural accessibility), students with disabilities and/or chronic illnesses will be given another opportunity to fulfil this part of the curriculum.

(5) An internship certificate issued by the host institution and serving as a basis for recognizing the completion of this requirement must document these items:

1. Institution and location where the internship has been completed.
2. Timeframe / duration and workload (hours per week) of the internship.
3. Description of assigned tasks and responsibilities.
4. Written assessment of internship by supervisor at host institution.

In the course of a practice-oriented internship the following qualifications can be acquired among others:

- Ability to apply the acquired subject-specific competences in a professional context
- Acquaintance with different application scenarios of subject-specific concepts
- Acquisition of soft skills (e.g., teamwork, communication competences, planning competences) in a professional context
- Familiarity with professional environments of Geoinformatics applications

§ 10 International mobility

Students of the Master's degree programme in Applied Geoinformatics are recommended to spend a semester of study abroad. The semester 3 is particularly suited for this study abroad. The recognition of courses and other academic achievements completed during the study abroad is conducted by the governing body responsible for study matters. The documents required for the assessment are to be provided by the student.

It is ensured that semesters abroad are possible without causing a delay in a student's course of study if the following conditions are met:

- during each semester abroad courses and other academic achievements totalling at least 30 ECTS credit points are completed
- the courses and other academic achievements completed during the study abroad are not identical to the content of courses and academic achievements already completed at the University of Salzburg
- before starting the semester abroad, it is stated by means of an official order which of the planned examinations will be recognised for the examinations stipulated in the curriculum.

In addition to subject-specific competences students can acquire the following qualifications by studying abroad:

- Acquisition and deepening of subject-specific knowledge of a foreign language
- Acquisition and deepening of general foreign-language skills (comprehension, conversation, …)
- Acquisition and deepening of organisational skills by independently planning the day-to-day study life in international administrative and university structures
- Familiarising with and studying in international university systems as well as broadening the individual perspectives in the student's own field of study
- Acquisition and deepening of intercultural competences.

Students with disabilities and/or chronic illnesses will be actively assisted by the university in searching for an opportunity to study abroad and in planning the semester abroad.

§ 11 Allocation of study places in courses with a limited number of participants

(1) For the following types of course the number of participants in the Master's programme in Applied Geoinformatics is limited as follows:

Lecture (VO)	no limit
Introductory seminar course (PS), Tutorial course (UE)	25 participants (or adjusted to number of available workplaces / instruments)
Seminar course (SE), Interdisciplinary project courses (IP) and colloquium course (KO)	16 participants

(2) If the maximum number of participants is exceeded by the number of enrolments for courses with a limited number of participants, those students for whom this course is part of their curriculum will be given priority.

(3) Study places will be allocated in the order specified in the Statutes of the University of Salzburg.

(4) For students participating in international exchange programmes, additional study places constituting at least ten percent of the maximum number of participants on each course will be available. These study places will be allocated by lot.

§ 12 Admission requirements for exams

The following admission requirements apply for the following exams:

Course / Module:	**Requirement/s:**
IP Application Development	VO Basics of Software Development PS Practice: Software Development
IP SDI Services Implementation	VO Design of Geospatial Data Models and Services VO OpenGIS: Standards, Architectures & Services

§ 13 Examination regulations

The following forms of performance assessment are possible for modules:

(1) All courses except for type VO require course attendance and are continuously assessed. Lectures (VO) are assessed based on a single written or oral exam at the end of the course.

(2) **Assessment within a module / course-oriented assessment**: all courses in the module are marked individually based on the module objectives (Continuous assessment courses: assessment of several different components; Lecture courses: assessment through a singular examination).

(3) For students with disabilities and/or chronic illnesses, alternative examination regulations suitable for each individual case will be offered in cooperation with the Service Facility for Family, Gender, Disability & Diversity.

§ 14 Master's examination before an examining committee

(1) The Master's programme in Applied Geoinformatics is concluded with a Master's examination before an examining committee worth 2 ECTS credit points.

(2) Taking the Master's examination before an examining committee requires proof of successful completion of all prescribed examinations, the compulsory internship and positive assessment of the Master's thesis.

(3) The Master examination before an examining committee consists of:

- a presentation of the Master's thesis by the person taking the examination (approx. 12 minutes),
- questions on the topic of the Master's thesis by the members of the examining committee,
- questions on two separate topics different from the topic of the Master's thesis proposed by the candidate from the modules [856M22] to [856M26] or [856M28] defined in the Master's programme in accordance with § 8 para. 3.

§ 15 Effective date

The curriculum will become effective on 1 October 2025.

§ 16 Transitional provisions

(1) Students who are registered for the Master's degree programme Applied Geoinformatics at the Paris Lodron University of Salzburg (version 2016, bulletin – special number 119, 23.03.2016 at the time this curriculum becomes effective are entitled to complete their studies at the latest by 30 September 2027 in accordance with these study regulations.

(2) Students are entitled to voluntarily enrol in this Master's degree programme at any time within the admission period. A written irrevocable declaration to this effect must be sent to the Admissions Office.

Course equivalency lists can be found in Annex II.

Annex I: Description of modules

Module learning outcomes refer to the *EO4GEO*[2] *Geographic Information Science and Technology Body of Knowledge for EO/GI* concepts [in square brackets] using permalinks. These permalinks comprise of the web address followed by the code (e.g. https://bok.eo4geo.eu/GC1-1 for [GC1-1] Complex systems).

Module name	Foundations
Module code	856M21
Total workload	6 ECTS credit points
Learning outcomes	Students will … - be able to adapt to the academic and professional requirements of the MSc AGI programme, leveraging knowledge from their diverse undergraduate backgrounds. - be able to apply fundamental scientific methods and principles of scientific writing to prepare for both supervised and independent work in advanced classes. - be able to demonstrate competence in project management, presentation techniques, facilitation, and supervision by designing practice-oriented projects that reflect professional workflows. - be able to organize tasks and challenges into structured, manageable projects, employing standard project management methodologies. - be able to confidently assume responsibilities in large-scale project environments, utilizing effective communication and management techniques. - develop skill sets for collaborative work and structuring of larger projects [DA2-1]. - have developed verbal and written communication skills to effectively disseminate research findings as a preparation for supervised and independent work in advanced classes. - have gained orientation regarding professional outlook and career development.
Module content	Students are adjusting to the requirements of the MSc AGI programme based on their respective (and different) first degrees. Orientation regarding professional outlook and career development. Planning and design of one's individual course of study, including specific methodology and / or domain emphases. Personal SWOT analysis and translation of outcomes into action. Written communication in science. Structuring of documents according to media and target audience. Scientific writing in English language. Adequate use and referencing of sources, empirical evidence and pertinent tools. Elementary research design. Professional ethics. Project management techniques and tools combined with fundamental management skills and principles. EO/GI Project management including problem analysis, assessment of user / customer / target group needs and requirements. Design and planning of workflows towards deliverables. Full project management cycle including use of PM methods (e.g. AGILE,

[2] https://bok.eo4geo.eu/GIST

	SCRUM, logical framework matrix), toolsets and strategies. Defining distributed responsibilities within a team. Quality assurance and reporting of deliverables.
Courses	UE Orientation, Career Development & ePortfolio PS Scientific Methods and Writing UE GI/EO Project Management
Type of exam	Assessment within a module / course-oriented assessment

Module name	GIScience: Theory and Research Methods
Module code	856M22
Total workload	6 ECTS credit points
Learning outcomes	Students will … - be able to describe the highly dynamic nature of the evolving field of Geographic Information Science or GIScience. - be able to work scientifically in the broader field of GIScience and communicate in an interdisciplinary manner with other fields based upon generic scientific as well as GIScience-specific skills and competencies. - have competences both in GIScience theory, including its epistemology, and in Geoinformatics applications fields. - be able to use theory in application contexts [CF]. Geospatial technologies support a wide variety of uses in society. - Be able to evaluate technological and scientific trends and determine whether they may provide opportunity or pose threats for our society.
Module content	The lecture / lecture series shall provide a broad overview over the fields of GIScience and Geoinformatics while complementing the content of other compulsory classes in this programme. GIScience is based upon the understanding that basic and applied research must be reflected within society. The seminar shall make participants sensitive to scientific questions in general, and when using Geographic Information in particular. Secondly, it will comprehensively discuss the EO4GEO body of knowledge[3] conceptual framework field called 'Geographic Information Science' or 'GIScience'. Seminar papers shall analyse the role of GIS and Geoinformatics applications in their social context considering the ideas and practices that have emerged among GIS users, demonstrating how they reflect the material and political interests of various societal groups. The seminar also discusses the impact of new GIS technologies on the discipline of geography and evaluates the role of Geoinformatics and GIScience within the wider transformations of a postindustrial society. Students should get acquaintance with application fields as well as with cutting-edge literature by leading scholars. The seminar provides the foundations for a critical rethinking of GIS and opens up scientific debates in the form of structured discussions.
Courses	VO Geographic Information Science and Technology SE Theory and Concepts of GIScience and Geoinformatics
Type of exam	Assessment within a module / course-oriented assessment

[3] https://bok.eo4geo.eu/CF

Module name	Digital Earth - Core Methods
Module code	856M23
Total workload	12 ECTS credit points
Learning outcomes	Students will … - be able to apply the respective methods in project-oriented work. - be able to take methodological responsibilities in working groups and complex workflows. - be able to design and implement advanced geomedia interfaces for use-case oriented media and devices and spatio-temporal user experiences [AM14-2, CV4-4, CV4-6, GS3-3]. - be able to critique the graphic design of several maps in terms of balance, legibility, clarity, visual contrast and more [CV3]. - gain technical skills to clearly communicate with a map (palette of colours, amount of information displayed…) and other factors such as narrative processes [CV3-8]. - be familiar with advanced methods, tools and techniques of remotely sensed imagery. - be able to decide on adequate Remote Sensing data sources and workflows across available passive and active sensors [DC-03]. - be able to master image analysis tools and methods to a degree to be confident in tackling 'real-world' application scenarios. - be able to explain how image processing and analysis methods are used to derive geospatial information from Earth observation imagery. - will be able to explain the purpose and perform of image pre-processing (calibration, filtering, and pre-classification) [IP1]. - will be able to apply specific image acquisition techniques (VHR optical data, Radar data, Lidar, UAV). - will be able to apply advanced image processing and analysis methods for the extraction of features and monitoring of change across remote sensing application domains [IP3-1, IP3-4, IP3-5, IP5-1]. - be able to choose and apply spatial- and geo-statistical methods to analyse multidimensional and multivariate data sets to explain and model complex relations and processes [CF6, AM7, AM8, AM9-2, AM9-4]. - be able to manage information extraction from large (‘big’) data sets, including flow of data, DBMS aspects and pattern analysis [AM-08-097].
Module content	Students are offered a selection of core geoinformatics methodologies like remote sensing, geomedia or data analysis, sharpening personal competence profiles in combination with IP courses, seminar and thesis topics. All courses have a strong practice orientation, combining conceptual foundations with a view towards applications. Content will include Remote Sensing – advanced sensors. Hyperspectral and Microwave analysis. Radiometric correction. | Geovisualisation – use case analysis and UX design. Design of flexible and responsive interfaces. Navigation of perspective views. | Data and process analysis – advances spatial statistics and pattern analysis. Geostatistics. Big data analysis. | Developing spatial insights for complex systems in society and environment.

Courses	PS Advanced Remote Sensing PS Cartographic Design & Geomedia UE Multivariate Statistics | PS Spatial Statistics
Type of exam	Assessment within a module / course-oriented assessment

Module name	Spatial Analysis and Modeling
Module code	856M24
Total workload	6 ECTS credit points
Learning outcomes	Students will … - be able to translate application domain problems into conceptual models and structured analytical workflows. - be able to map conceptual spatial relations (topological and geometrical) to the body of analytical methods [AM2-1, AM3-6, AM4-4]. - be able to model and represent complex processes through complete Geoinformatics workflows. - Be able to apply a broad spectrum of analytical methods, including spatial statistical and remote sensing techniques, in practical scenarios. - be able to recognize the value of different metrics in the spatial as well as attribute domains (e.g. fuzzy algebra) [AM3-1]. - be able to critically evaluate and interpret analytical results based on hands-on experience with selected methods and their parameterization contexts. - be able to describe shape characteristics of spatial features as well as complex landscape structures with the aim of diagnosing change [AM3-3]. - be able to identify, select (including SQL clauses) and statistically describe spatial features based and their distance to and/or topological relations with a target feature [AM2-2, AM2-3, AM4-1, AM4-3]. - be able to estimate values of a continuous (real or thematic) surface based on sample points through interpolation methods [AM3-5]. - be able to select adequate interpolation methods (based on characteristics of surface theme, measurement level, sample density) and assess quality of results [AM6-2]. - be able to derive characteristics of continuous surfaces as a basis for advanced models [AM6, AM3-2]. - be able to develop and adequately parameterize basic models of surface runoff, groundwater dynamics, visibility, solar irradiation and diffusion / spreading over inhomogeneous surfaces [AM6-3, AM6-4, AM6-5]. - be able to apply topological relations for combination of spatial themes (overlay analysis), derive and implement weighting schemes [AM4-3]. - be able to find best routes (paths) across fields and networks [AM11 https://bok.eo4geo.eu/IP4-1-6-3,4,6]. - be able to allocate areas and features to service centres, distinguish from ('optimal') location analysis [AM11-7, AM12-1,4]. - be able to choose classification and regionalization methods according to specific requirements and contexts.

	- be able to design, implement and validate complex workflows and process models built from individual methods and operations [IP4-1-6, AM5-7,8]. - be able to move from data analysis to generation of context-specific information and the creation of higher-level domain knowledge [AM11-2].
Module content	This core area of Geoinformatics builds advanced translation skills from application domain problems towards conceptual reframing and structuring, and into the analytical methods and toolsets of Geoinformatics. Based on this knowledge of operational methods, complete workflows representing complex processes are modeled and represented in structured frameworks for spatial decision support across domains. Through a combination of a practical class including extensive lab components with an advanced seminar, students develop broad competences across the spectrum of analytical methods (optionally including spatial statistical and remote sensing methods), as well as a deeper understanding and critical appreciation of results through application experience of selected methods and their parameterization contexts. Topological relationships. Map Algebra. Distance metrics. Spatial query operators. Fuzzy metrics and algebra. Shape and landscape metrics. Interpolation methods (trend surface, IDW, … and cross reference to statistical methods like Kriging). Surface descriptors. Spatial models with gravity and radiative mechanisms. Cost surface modeling. Network: Dijkstra algorithm. Vector and raster overlay, incl. weighted overlay and AHP. Allocation and location analysis. Nodal and homogeneous regionalization. Process model building. Spatial decision support strategies.
Courses	PS Methods in Spatial Analysis SE Spatial Analysis and Modeling
Type of exam	Assessment within a module / course-oriented assessment

Module name	Geo-Application Development
Module code	856M25
Total workload	12 ECTS credit points
Learning outcomes	Students will … - be able to demonstrate a structured understanding of software development from a software engineering perspective, enabling effective communication with developers and integration into development teams as geospatial experts. - be able to apply programming skills in at least two development environments and scripting languages to design simple software programs, customize existing applications, and automate basic workflows. - be able to analyze and translate geospatial application domain requirements into software development tasks, verified through a development project in one of the selected implementation platforms. - be able to develop practical geo-applications for web, mobile, or desktop analytical environments, adapting to different platforms and architectures. - be able to design and carry out software projects in accordance with standardized and structured SWE processes [DA1-5, DA1-2, DA1-4, DA2-8]. - be able to select the appropriate programming or scripting language according to the specific goals of a software project

	- be able to apply their basic knowledge of modeling software systems for communication between different stakeholders in a SWE project. - be able to programmatically access external code libraries and Application Programming Interfaces (APIs) of commercial off-the-shelf (COTS) and open source software in their own programs to achieve their goals [WB5-1, WB7-2]. - be able to develop software programs to pre-process and analyze spatial data (read, manipulate, store, visualize, classify) that are available in a variety of formats (CSV, ShapeFiles, Geopackage, GeoJSON, GML, KML, raster formats etc.). - be able to integrate data from service-oriented architectures (SOA), including OGC Web Services (OWS) into their software programs through service-based data access [WB1, WB5]. - be able to read and understand the documentation of software libraries. - be able to create user interface components in selected development environments [DA1-6]. - be able to batch analysis tasks in the application domains of GIS and remote sensing. - be able to develop geo-applications for different platforms (desktop, web, mobile, …) and application domains (GIS, remote sensing) [CV5-2, CV4-5, CV4-6].
Module content	Through a combination of an introductory lecture and a lab exercise as well as an IP (selectable from different application domains) including extensive practical components, students develop broad competences across the spectrum of application development methods on different platforms and programming languages (at least two) as well as different application domains (optionally including remote sensing applications): Principles of software engineering. Procedural and object-oriented programming principles. Approaches to modeling software systems using UML. Service-oriented Architectures. OGC Web Services (OWS). Client-side and server-side scripting languages (e.g., JavaScript, Python, R or similar). Object-oriented programming vs. scripting. Server-side OO programming and scripting (e.g. JSP, Python, PHP, or similar). Programmatic database access. Program development for spatial data pre-processing. APIs in commercial off-the-shelf (COTS) and/or open-source software. Web Mapping. Web GIS. Batch processing for GIS and remote sensing analysis and classification tasks. Basic GUI design.
Courses	VO Basics of Software Development PS Practice: Software Development IP Application Development
Type of exam	Assessment within a module / course-oriented assessment
Requirements	VO Basics of Software Development and PS Practice: Software Development are required for IP Application Development

Module name	Geospatial Infrastructures & Geoportals
Module code	856M26

Total workload	12 ECTS credit points
Learning outcomes	Students will ... - be able to explain the relevance and added value of geospatial information in particular use cases [GS3]. - be able to describe the main components of SDIs and know key objectives, benefits and current state-of-the-art of such initiatives [DA3, OI3b]. - be able to understand the conceptual strategies, organizational requirements and legal frameworks for leveraging the advantages of open geospatial data infrastructures [OI1,GS1]. - be able to explain the role of metadata for spatial data sharing across distributed networks [GD12]. - be able to describe the existing spatial data sharing policies including intellectual property rights, security issues, privacy issues, Open Government data initiatives [GS3, GS1-3, OI3]. - understand the principles and techniques of spatial data organization and apply these principles and techniques to design and build spatial databases [DM2, DA4]. - recognize the importance of standardized data models to store, analyse and manipulate geographic phenomena. - be able to explain the Service Oriented Architecture (SOA) concept together with its underlying publish-find-bind principle. - know internationally accepted geographic- and IT standards (OGC, OASIS & ISO) and apply these in practical projects [DM2-1]. - be able to understand, design and implement geodata models according to standardised approaches [CF3-1, CF4b, CF5b, CF6]. - be able to publish geodata and geoprocessing services over the web: map services, data services (editing, search, image service), and analytical services. - be able to define the interoperability needs beyond technical issues like direct access and industry standards on a legal, semantic and organizational level [OI4-1]. - be able to explain which elements determine the quality of geospatial data [GD4-1]. - be able to utilize open, shared GIS resources to design and use Open GIS data structures, workflows and processes leveraging information repositories.
Module content	Concepts, technological and non-technological components to facilitate and coordinate the exchange of and sharing of spatial data. Spatial data infrastructure (SDI) comprises technology, standards, policies, organisational/legal aspects, human resources and related activities to integrate, exchange, process, maintain and preserve geospatial data and information. *Conceptual foundations:* Geographic information - reference model, spatial schema, temporal schema, spatial referencing; spatial relationships, functions and operations; interoperability (syntactic, semantic and technical); distributed IT architectures (private/public cloud, Internet of Things etc.); spatio-temporal information integration; spatial data infrastructure concepts (service-orientation; semantic web). *Technological Foundations:* Geospatial data modelling (UML, GML); application schema; GI Ontologies; domain bridging data integration; Spatial n-dimensional and Graph Databases; Geospatial Data Management (Simple feature access, ISO 13249-3); OGC web-service architectures (view,

	download, discovery & registry, web processing and security services); Communicating with WebGIS; GI applications services using COTS and open-source solutions; private/public cloud GIS computing platforms; data & metadata repositories; Real-time GIS. *Standards and Regulations for Interoperability:* ISO/TC211 19100 standards series, Open Geospatial Consortium; Legal acts: Laws on SDIs, Environmental INSPIRE, Public Sector Information INSPIRE Directives; data validity, privacy and data security considerations. *Initiatives:* Open Government Data; GSDI-Global Spatial Data Infrastructure, United Nations Geospatial Network.
Courses	VO Design of Geospatial Data Models and Services VO Open GIS: Standards, Architectures and Services IP SDI Services Implementation
Type of exam	Assessment within a module / course-oriented assessment
Requirements	VO Design of Geospatial Data Models and Services and VO Open GIS: Standards, Architecture and Services are required for IP SDI Services Implementation

Module name	Interdisciplinary/Integrated/Interactive Project
Module code	856M27
Total workload	6 ECTS credit points
Learning outcomes	Students will … - be able to integrate and apply acquired competences to complete a comprehensive project from inception to completion. - be able to successfully manage all major project phases, including problem analysis, conceptualization, workflow design, data acquisition, schema implementation, analysis, validation, and communication of key outcomes. - be able to recognize and address the challenges of integrating multiple components into a cohesive and functional whole. - be able to apply standard project management methodologies and communication strategies to effectively coordinate tasks and collaborate in major project environments. - be able to demonstrate the ability to take responsibility for project execution and decision-making in complex professional settings. - be able to leverage the capstone project experience as a foundation for successfully developing and completing the Master's thesis.
Module content	Problem analysis. Assessment of user / customer / target group needs and requirements. Design and planning of workflows towards deliverables. Data integration. Full project management cycle including use of PM methods (e.g. logical framework matrix), tool set and strategies. Communication and intervention planning with users / customers. Distributed responsibilities within a team. Communication and presentation techniques aligned with overall project workplan. Quality assurance and reporting of deliverables.
Courses	IP Integrated Project (topics vary)
Type of exam	Assessment within a module / course-oriented assessment
Recommendation (urgent)	Completion of at least 30 ECTS credit points with the Master‘s programme in Applied Geoinformatics.

Module name	Specialization Courses
Module code	856M28
Total workload	12 ECTS credit points
Learning outcomes	Building on the Digital Earth – Core methods, students will deepen their expertise in geoinformatics. They will model and represent complete work-flows for complex processes across various domains. Students have the option to specialize in: - determining the most appropriate data collection method for specialized data collecting methods [GD2]. - selecting and implementing advanced geodata acquisition processes, using e.g. photogrammetry, LiDAR, in-situ and mobile sensors, crowdsourcing and UAV platforms, including real-time data streams [AM14, components from GD] [PS2-2-1]. - explaining which elements determine the quality of geospatial data [GD4-1]. - current research topics in cartography. - facilitating advanced cartography methods for specialized mapping and visualization instances; maps communication in virtual and immersive environments [DM5-3, CV-3-9, CV4-4, CV4-6, CV4-7]. - preparing and supporting decisions through (geo-)simulation [GC2]. - discussing different ways of simulating space and visualizing model behavior. - handling basic technical principles of image segmentation and object-based classification and validation. - understanding and applying the Object-Based Image Analysis (OBIA) paradigm to the extraction of features and monitoring of change across remote sensing application domains [IP3-7]. - explaining, why image understanding goes beyond feature extraction [IP3]. - understanding current trends of big data in remote sensing and its background as well as applying new concepts and approaches. - identifying different options of spatially explicit artificial intelligence techniques [GC3] for GI analysis and image processing [GC3-12, IP3-4-7]. - selecting geospatial artificial intelligence for different real-world problems. - Explaining how spatial simulation models can be used to advance knowledge in different geographic scenarios (e.g. transportation, health geography, urban and regional analysis). [GC2-4, GC2-5. GC2-6]
Module content	Students can choose from a range of advanced specialization courses in geoinformatics methodologies, covering topics such as advanced geodata acquisition, geospatial data management, analysis, remote sensing, and more. Additionally, specialized Blended Intensive Program (BIP) courses and other courses, which receive pre-approval from the responsible body can

	be acknowledged, adding even more value to the students' educational journey. Depending on courses, content will include: Advanced Cartography | Remote Sensing – field and mobile data acquisition and drone photogrammetry. Advanced sensors. OBIA with transferable rules and app development. | Navigation of perspective views. | Data and process analysis – Big data analysis | GeoAI: geospatial artificial intelligence | Drone mapping and photogrammetry | geospatial data quality assurance Different specialized geospatial data acquisition processes through various methods will be discussed. Additionally different methods and techniques for data quality assurance will be discussed, which are being used to ensure that the data meets certain standards and is appropriate for its intended use. Advanced cartographic communication, effective map design, interactive geographic visualization methods, engagement with new technologies like 3D cartography and mapping will be discussed and evaluated. By combining geospatial science, artificial intelligence (AI), and machine learning (ML), new methods are evolving to analyze and interpret spatial data. Geospatially explicit AI techniques to extract insights, patterns, and predictions from geospatial data, enabling smarter decision-making in various domains will be discussed. Accessing and processing of massive amount of big data, data cubes, artificial intelligence (knowledge-based systems and machine learning) and possible application areas for continental- or global-scale remote sensing image processing. Understanding methods and tools for multi-scale representation and class modelling by integrating spatial concepts and knowledge-based strategies for advanced image understanding. Analyzing data that varies across both space and time.
Courses	UE Geodata Acquisition & Quality Assurance PS Advanced Cartography PS GeoAI: Geospatial Artificial Intelligence PS Spatial Simulation PS Digital Earth: Big Earth Data Concepts PS Spatio-temporal Data Analytics Additional options identified by RB
Type of examination	Assessment within a module / course-oriented assessment

Module name	Transdisciplinary module for socio-ecological crises
Module code	856M29
Total workload	6 ECTS credit points
Learning outcomes	Students … - know important social and ecological challenges. - can name problems in relation to socio-ecological challenges [GS3-4]. - understand the connections between cause and effect of issues with socio-ecological implications. - are able to question societal developments and analyse and classify them in relation to socio-ecological challenges.

	- are able to assess arguments and develop rationales applicable to socio-ecological questions. - can design strategies that will contribute to finding solutions to socio-ecological problems.
Module content	As part of each degree programme students shall also be taught awareness of important social and ecological challenges and their significance for current societal developments and phenomena as well as basic skills in dealing with them. The transdisciplinary module aims to achieve exactly that.
Courses	Courses to be freely elected from the course catalogue regarding topics relating to socio-ecological crises such as gender studies, sustainability and climate crisis, democracy education, research on poverty or migration.
Type of examination	Assessment within a module / course-oriented assessment

Annex II: Course equivalency lists

OLD Curriculum		NEW Curriculum	
Course	**ECTS**	**Course**	**ECTS**
856M12 - Lectures in GIScience	2	856M22 - Geographic Information Science and Technology	3
856M12 - GIScience: Theory and Concepts	4	856M22 - Theory and Concepts of GI Science and Geoinformatics	3
856M13 – Geovisualization and Advanced Cartography	6	856M23 - Cartographic Design & Geomedia 856M28 - Advanced Cartography	3 3
856M14 - Methods in Spatial Analysis	2	856M24 - Methods in Spatial Analysis	3
856M14 - Analysis and Modeling	4	856M24 - Spatial Analysis and Modeling	3
856M17 - I3: Interdisciplinary/ Integrated/ Interactive Project	12	856M27 - Integrated Project (topics vary) 856M21 - GI/EO Project Management	6 3

Annex III: Application procedure

The application procedure consists of two phases:

Phase 1: Online application

Generally, all submitted foreign documents, including all certificates and confirmations, must be verified by the country of origin and acknowledged by the Austrian representation authorities in that country (see the admissions department website).

Students have to provide the following documents for their online application:

- Application form
- Bachelor's diploma, diploma supplement (including course duration, description of the content and credits) and / or transcript of records including course titles, credit hours & grades
- Copy of passport
- Proof of language proficiency (e.g., school leaving certificate "Reifeprüfungszeugnis" within the EU)

Details including application deadlines can be found on the admissions department website.

Phase 2: Preselection

An admission team will decide whether applicants will be recommended for admission. This decision is communicated to the admissions department of the University of Salzburg.

The final decision on admission is made by the University of Salzburg.

In case the documents provided do not lead to a clear decision in terms of the applicant's qualification, the admission team may conduct an additional (online) interview with the applicant.

Criteria for the interviews include:

- Key competences for the intended Master's program
- Subject-related English skills
- Motivation, objectives, and expectations of the studies
- Previous academic achievements or practical experience

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