



SUBJECT-SPECIFIC CRITERIA

Relating to the accreditation of Bachelor's and Master's degree programmes in geosciences in a broader sense including geography

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The following specifications complement the "ASIIN General Criteria for the Accreditation of Degree Programmes".

1. Classification

1.1 Function

The Subject-Specific Criteria (SSC) of the Technical Committee for Geosciences have the premise that the intended learning outcomes framed by Higher Education Institutions in their own responsibility and according to their academic profile concerning the programmes submitted for accreditation build the main scale for their curricular review.

Above this the Subject-Specific Criteria of all ASIIN Technical Committees meet a number of important functions:

The SSC are the result of an assessment, regularly performed by ASIIN Technical Committees, which summarize what is considered as good practice by a professional community formed equally by academics and professional practitioners in higher education and is required as future-oriented quality of training in the labour market. The expectations outlined in the SSC for the achievement of study objectives, learning outcomes and competency profiles are not developed statically. They are rather subject to constant review in close cooperation with organizations of the professional community, such as associations of faculties and university departments, professional societies and federations relating professional practice. Applicant universities are asked to study critically the interaction between the intended learning outcomes they strive for, the curricula and their relating quality expectations by using SSC and to position themselves in the light of their own higher education goals.

In their role in the accreditation process the SSC also provide a professionally elaborated basis for discussion among experts, Higher Education Institutions and bodies of ASIIN. By this they make an important contribution to the comparability of national and international accreditation procedures, since it should not be left to chance of the characters of the individual evaluators which technical parameters find their way into discussion and individual assessment. Simultaneously the SSC enumerate those abilities, skills and competencies which may typically be considered as state of the art of a discipline, but which can always be exceeded and varied, and also should be in accordance with the objectives of the university.

For inter- and multidisciplinary studies the SSC of ASIIN can provide orientation for presentation and evaluation. However, they are basically aligned on the core subjects of particular disciplines.

The SSC of the ASIIN are positioned and coordinated internationally and thus contribute to the achievement of the unified European Higher Education Area. They act on requirements of the "Bologna 2020" European strategy to formulate subject specialized, discipline-oriented learning outcomes as one of the most important means for the promotion of academic and professional mobility in Europe as quality requirement. The SSC consider, among others, the many preparations in the context of European projects (e.g. "Tuning") and professional networks.

1.2 Scope of responsibility

Degree programmes in geosciences in a broader sense including geography involve the traditional disciplines **geography, geophysics, geology, geo-ecology, meteorology, mineralogy, oceanography, palaeontology** as well as "**geo-engineering sciences**" (e. g. geoinformatics, hydrogeology, engineering geology, cartography). This is added by interdisciplinary degree programmes, for instance in "Geosciences" the curricular shares of which have to be adjusted as the single case may be.

1.3 Collaboration of the Technical Committees

The Technical Committee Geosciences works together with the other Technical Committees of ASIIN, mostly to give consideration to the requirements of interdisciplinary study programmes. The universities are called upon to submit their assessment of the assignment of one or several Technical Committees in the course of the application for an accreditation procedure.

As a rule, the Technical Committee Geosciences is responsible for the supervision of accreditation procedures regarding degree programmes with a share of more than 50 percent of contents relating to geosciences and appoints auditors from other fields of expertise if needed (type 1). Interdisciplinary study programmes with a weighted share (below and up to 50 percent/type 2) of contents relating to geosciences the Technical Committee Geosciences and the participating technical disciplines are either jointly responsible or the Technical Committee simply provide technical consultants.

The Technical Committee Geosciences refers exemplarily to the Subject-specific Criteria issued by the ASIIN Technical Committee 03 Civil and Geodetic Engineering which are at the universities' disposal for the purpose of classifying degree programmes focusing on geodetic engineering. As to neighbouring disciplines, it is verified in the single case, on the basis of the universities' self-assessment, in how far the allocation to one of the two Technical Committees is to be effected. On principle, the allocation of degree programmes to the Technical Committees 11 Geosciences and 03 Civil and Geodetic Engineering is orientated on the professional fields the graduates are aiming to work in.

With a view to degree programmes in geodetic engineering, geodesy, geo-information engineering, geomatics, or geoinformatics having developed from the professional field of survey engineers and geodesists, the ScC issued by the Technical Committee 03 apply if in such degree programmes more than 40 % of all credit points are awarded for contents relating to engineering sciences (subject-specific fundamentals and consolidation).

Degree programmes in cartography, cross-subject degree programmes in geosciences with a smaller share than 40 % of all credit points to be awarded for contents relating to geodesy and Surveying, and degree programmes in geo-information engineering, geomatics, and geoinformatics having emerged from a more geo-scientific orientation, may be based on the SSC issued by the Technical Committee 11.

2. Educational Objectives and Learning Outcomes

The educational objectives are outlined by the description of the learning outcomes required by the graduates for practising their profession or for post-graduate studies. The outcomes vary in extent and intensity in accordance with the differing objectives of Bachelor's and Master's programmes.

The following learning outcomes are oriented on the qualification frame for degree programmes in geosciences which was developed in the scope of the EU-financed Euro-Ages project (www.euro-ages.eu).

2.1 Requirements for Bachelor's Degree Programmes

Successfully completed Bachelor's degree programmes are to facilitate early professional careers (professional qualification) as well as qualify the graduates for taking up scientifically advanced studies or additional studies other than in geosciences.

Graduates of the disciplines of geosciences require a sound education setting store by broad knowledge of the fundamentals of natural sciences, terrain work, and scientific working methods.

Typical learning outcomes of Bachelor's degree programmes are:

Underlying basis

- Basic knowledge and understanding of the natural sciences (Physics, Chemistry, Mathematics) underlying the study of Geology
- Knowledge and understanding of the essential features, processes, materials, history and the development of the Earth and life
- Basic knowledge and understanding of the key aspects and concepts of geology, including some at the forefront of that discipline
- Knowledge of the common terminology and nomenclature and the use of bibliography in Geoscience
- Awareness of the wider spectrum of geological disciplines
- Awareness and understanding of the temporal and spatial dimensions in Earth processes
- Awareness of the applications and responsibilities of Geosciences and its role in society including its environmental aspects
- Awareness of major geological paradigms, the extent of geological time and plate tectonics
- Knowledge and understanding of the complex nature of interactions within the geosphere
- Appropriate knowledge of other disciplines relevant to geosciences

Analysis, Design and Implementation

- Some understanding of the complexity of problems in the specific field of study and the feasibility of their solution
- Understanding the need of a rational use of earth resources
- Basic ability in the formalisation and specification of problems whose solution involves the use of geo-methods
- Knowledge of appropriate solution patterns for geosciences problems
- Basic ability to describe a solution at an abstract level
- Knowledge of the range of applications of geosciences
- Ability to integrate field and laboratory evidence with theory following the sequence from observation to recognition, synthesis and modelling
- Appreciation of issues concerning sample selection, accuracy, precision and uncertainty during collection, recording and analysis of data in the field and laboratory
- Ability to formulate and test hypotheses

Technological, Methodological and Transferable Skills

- Basic ability to become familiar with new geological methods and technologies
- Ability to select and use relevant analytic and modelling methods
- Basic ability to apply appropriate technology and use relevant methods
- Ability to use simple quantitative methods and to apply them to geological problems
- Basic ability to independently analyze Earth materials in the field and laboratory and to describe, process, document and report the results
- Ability to undertake field and laboratory investigations in a responsible and safe manner, paying due attention to risk assessment, rights of access, relevant health and safety regulations, and sensitivity to the impact of investigations on the environment and stakeholders
- Basic ability to combine theory and practice to complete geology tasks
- Ability to undertake literature searches, and to use data bases and other sources of information
- Ability to receive and respond to a variety of information sources (eg textual, numerical, verbal, graphical)
- Ability to conduct appropriate experiments, to analyze and interpret data and draw conclusions
- Basic awareness of relevant state-of-the-art technologies and their application

- Basic ability to solve numerical problems using computer and non-computer based techniques
- Basic knowledge of the application of information technology to geological science
- Ability to use spreadsheet and word-processing software

Other Professional Competencies

- Ability to complete assigned tasks in a range of technical, economical and social contexts
- Ability to learn and study including effective time management and flexibility
- Awareness of the concept of professionalism and professional ethics
- Knowledge of the economic, social, environmental and legal conditions expected in professional practice
- Basic awareness of project management and business practices and understanding of their limitations
- Ability to work effectively as an individual and as a member of a team
- Recognition of the need for, and engagement in, self-managed and life-long learning
- Ability to organise their own work independently
- Basic ability to formulate an acceptable problem solution using geological methods in a cost-effective and time-efficient way
- Basic knowledge in estimating and measuring costs and productivity
- Basic ability to communicate effectively in written and verbal form with colleagues, other professionals, customers and the general public about substantive issues and problems related to their chosen specialisation
- Basic ability to prepare, process, interpret and present data, using appropriate qualitative and quantitative techniques and packages

2.3 Requirements for Master's Degree Programmes

As a continuation of an initial university degree Master's degree programmes lead to a consolidation the analytic-methodical competences acquired in first-cycle degree programmes. At the same time, the technical competences gained in initial degree programmes are advanced and extended.

In addition to the learning outcomes mentioned above, graduates of Master's degree programmes in the field of geosciences typically have acquired the following learning outcomes:

Underlying Basis

- advanced knowledge and understanding of the principles of Geosciences
- deeper knowledge of a chosen specialization
- critical awareness of the forefront of their specialization

- advanced understanding of earth system relevant to their specialisation
- appreciation of the learning capacity needed to progress to independent research

Analysis, Design and Implementation

- ability to specify and complete geological tasks that are complex, incompletely defined or unfamiliar
- some ability to formulate and solve problems in new and emerging areas of their discipline
- ability to apply state of the art or innovative methods in problem solving, possibly involving use of other disciplines
- ability to think creatively to develop new and original approaches and methods

Technological, Methodological and Transferable Skills

- ability to design appropriate experiments, to analyze and interpret data and draw conclusions integrating knowledge from different disciplines, and handling complexity
- ability to use advanced, and to develop customized, quantitative methods
- comprehensive understanding of applicable techniques and methods for a particular specialisation, and of their limits
- awareness of the limits of current knowledge and the practical application of the state-of-the-art technology
- knowledge and understanding of Geosciences to create models of complex systems and processes
- basic ability to contribute to the further development of Geosciences in practice and research

Other Professional Competences

- ability to produce independent work in their professional and scientific fields
- ability to manage and work effectively as leader of teams that may be composed of different disciplines and levels
- basic ability to work effectively and communicate in national and international contexts
- appreciation of the role of Geosciences in the development of knowledge, wealth creation and improving quality of life
- ability to evaluate performance as an individual and a team member
- ability to identify individual and collective goals and responsibilities and to perform in a manner appropriate to these roles

- ability to evaluate critically of professional and research papers
- ability to plan and appropriate programme of continuing professional development