



This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.



# **EURO-AGES**

  

## **QUALIFICATION FRAMEWORK**

  

### **AND**

  

## **ACCREDITATION CRITERIA**

  

### **FOR**

  

## **GEOLOGY STUDY-PROGRAMMES IN EUROPE**

**31.01.2011**

Euro-Ages

European Accredited Geological Study Programmes

[www.euro-ages.eu](http://www.euro-ages.eu)

#### Copyright Notice

This document is subject to copyright law. In general, it may not be used or reproduced for any other purpose without first obtaining written and explicit permission. Authorisation to reproduce such material must be obtained from the copyright holders concerned.



This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.



## TABLE OF CONTENTS

<b>Preamble.....</b>	<b>A</b>
<b>1. Programme Outcomes for Accreditation.....</b>	<b>4</b>
1.1. Learning Outcomes for First Cycle Degree Programmes .....	6
1.2. Learning Outcomes for Second Cycle Degree Programmes .....	9
<b>2. Guidelines for Programme Assessment and Programme Accreditation.....</b>	<b>11</b>
2.1. Guidelines for the Criteria and Requirements of Programme Assessment .....	11
2.2. Guidelines for the Evaluation of Individual Requirements .....	16
2.3. Guidelines for the Criteria of Programme Accreditation.....	16
<b>3. Procedures for Programme Assessment and Programme Accreditation .....</b>	<b>17</b>
3.1. Application by a Higher Education Institution (HEI) .....	17
3.2. Guidelines for the Procedure of Programme Assessment .....	17
3.3. Guidelines for the Procedure of Programme Assessment .....	18
<b>4. Recommended Template for Publication of Results .....</b>	<b>19</b>
<b>5. Appeal Mechanism .....</b>	<b>20</b>
<b>ANNEX .....</b>	<b>I</b>

## Preamble

These Standards and Criteria are intended to provide a means for reviewing the quality of higher education geology qualifications in the European Higher Education Area (EHEA), in a way that encourages the dissemination of good practice and a culture of continuous improvement of geology programmes. They have been developed within the Euro-Ages Project, the principal aim of which is to develop a qualification framework for the assessment of geology degree programmes in the EHEA. Given the great diversity of geology education across Europe, the attempt to create framework standards comprising all areas of the geology discipline appears ambitious. The Euro-Ages Framework is thus intended as a broad common denominator, or overarching reference point, for the variety of geology programmes. In order to allow for possible inclusion of existing geology specialisations within European Higher Education Institutions (HEIs), the framework must be formulated in rather general terms. The Standards and Criteria contained in this document represent a quality threshold. All graduates of programmes assessed against the Euro-Ages Standards are expected to achieve the programme learning outcomes stated therein.

*Principal aim*

1. The objective of the Lisbon strategy to create a “knowledge-based society”, and thus to enhance competitiveness and employability throughout Europe requires reform of higher education systems within Europe. In this context, the Bologna Process aims at establishing a European Higher Education Area. The European Commission is supporting projects aiming to contribute to this reform process. As outlined by the European Ministers of Education in Berlin in September 2003, quality of higher education is "at the heart of the setting up of a European Higher Education Area". Geology is certainly to be ranked as a strategically important discipline given the new global competitive challenge Europe faces. It is thus particularly important in the geology area to develop quality standards for Higher Education programmes and to create and disseminate mechanisms to encourage improvement of quality of education.

*Background*

2. Accreditation of a geology degree programme is the primary result of a process used to ensure the suitability of that programme as providing the education base for the entry route to professional practice. It involves a periodic assessment against accepted standards of geology higher education. Independent, third-party accreditation is essentially based on a peer review process, undertaken by appropriately trained and independent teams comprising peers from both academia and geology practice, in accordance with agreed principles. It is important that accreditation

*Accreditation*

processes go beyond judgement on the achievement of a minimum standard, and effectively promote the idea of continuous improvement of the quality of higher education programmes.

3. The Standards for Accreditation can be used in both the design and the evaluation of programmes in all specialisations of geology. They are expressed as broad generic programme learning outcomes that describe in general terms the capabilities required of graduates from accredited *First Cycle* and *Second Cycle* geology programmes, as defined in the Framework for Qualifications of the European Higher Education Area. Consequently, they can be interpreted and elaborated by users to reflect the specific demands of different cycles and specialisations.

*Standards*

4. Although the Framework is expressed in terms of accrediting degree programmes, it can also be used in relation to recognition of agencies that accredit (or intend to accredit) geology programmes, in assessing the consistency of their rules and standards with the requirements of the Framework ('meta-accreditation'); alternatively, it can be used as a guideline for the design and development of Standards and Procedures for new accreditation agencies. The Standards and Criteria are intended to be widely applicable and inclusive, in order to recognise the diversity of degree programmes around Europe that provide the education necessary for a graduate to enter work as a professional geologist.

*Application  
fields*

5. The Framework Standards describe the programme (learning) outcomes of an accredited higher education programme but allow for considerable variation in the emphasis of individual programmes. The development of new programmes of study or of new and different ways of delivering the curriculum is to be encouraged. HEIs are also encouraged to provide incentives for excellence in programme development and refinement but it is left to the responsibility of the HEI as to how these incentives are provided. The standards and criteria do not address conditions of access to programmes: these are handled by HEIs, in accordance with national regulations and/or requirements including new and innovative programmes.

*HEI  
Autonomy*

6. Throughout the following statements of Standards and Procedures, the term "geology graduate" is used to describe someone who successfully completes an accredited programme in geology. It is for the appropriate authority in each country to decide if a qualification, accredited or not, is sufficient for professional practice in geology in that country, or if further education, training or industrial experience are necessary. The Euro-Ages accreditation label will assist such decisions, and particularly those that involve transnational recognition.

*Professional  
recognition*

7. The development of the programme learning outcomes has been informed by the report 'A Framework for Qualifications of the European Higher Education Area' agreed by the Ministerial Conference in Bergen in May 2005, and by the Dublin Descriptors referred to therein. It is also assumed that all programmes to be accredited fulfil the criteria set out in the ENQA '[Standards and Guidelines for Quality Assurance in the European Higher Education Area](#)' and also agreed by the Bergen Conference. Furthermore, it has been informed by the [European Qualifications Framework](#) for lifelong learning proposed by the European Commission for a Recommendation of the European Parliament and of the Council.
8. Further explanations on background and objectives of the Euro-Ages Project can be found in the attached **Annex**. It also contains a glossary where terms used in this document are explained and clarified.

*Relevant  
official  
documents*

*Annex*

## 1. Programme Outcomes for Accreditation

*Learning outcomes are statements of what a learner is expected to know, understand and/or be able to demonstrate at a completion of a period of learning.<sup>1</sup>*

The programme outcomes can be described as quality standards for competencies, skills and knowledge. Graduates of an accredited course would be expected to have achieved these as the education base for practising their profession or for post-graduate studies. It is important that the programme outcomes vary in extent and intensity in accordance with the differing objectives of First and Second Cycle degree (FCD and SCD) programmes. They have been arranged in the following four categories:

- Underlying Basis for Geology
- Analysis, Design and Implementation
- Technological, Methodological and Transferable Skills
- Other Professional Competencies

For each of the mentioned categories expected programme learning outcomes for geology programmes have been formulated.

The first category “Underlying Basis for Geology” identifies capabilities that are essential to satisfy the other learning outcomes. Furthermore, it provides help for defining which knowledge and understanding graduates should demonstrate of their geology specialisation as well as of the wider context of geology. Subsuming the aspects “Analysis, Design and Implementation” in a single category appears worthwhile because they describe the basic steps of a work cycle. The category “Technological, Methodological and Transferable Competencies” refers to the expected ability of a graduate to work to combine and abstract his/her technical skills to solve problems involving aspects of a wider, technological context. Thus, he/she is able to use appropriate methods and material to achieve a specific objective. Social or soft competencies, listed under the category “Other Professional Competencies” are crucial to communicate information, ideas, problems and solutions. Besides the so-called soft skills, the category refers to project management skills and the knowledge of disciplines and those ancillary principles that are relevant to the working environment of the graduate’s specialisation.

The same arrangement of categories was maintained for the programme learning outcomes of Second Cycle Degree (SCD) programmes. They apply in addition to the competencies described for graduates of FCD programmes. Although all four outcome categories are used to describe expected outcomes of both FC and SC programmes, there are important differences in the requirements at the two levels. These differences in the levels of First and Second Cycle accredited geology programmes should inform the interpretation of the programme learning outcomes by HEIs and by auditing teams. For instance, whereas First Cycle graduates should be

---

<sup>1</sup> European Commission (2005): A Framework for Qualifications in the European Higher Education Area - background report. page 29. [http://www.ond.vlaanderen.be/hogeronderwijs/bologna/documents/050218\\_OF\\_EHEA.pdf](http://www.ond.vlaanderen.be/hogeronderwijs/bologna/documents/050218_OF_EHEA.pdf)



This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.



able to formalise real live problems where geology is a part of the solution, Second Cycle graduates are, in addition, expected to have demonstrated their ability to specify and complete geology tasks that are complex, incompletely defined or unfamiliar.

No restriction is implied or intended by the Framework in the design of programmes to meet the specified programme learning outcomes. For example, the requirements of more than one learning outcome could be satisfied within a single module or unit such as project work. Similarly, it is possible that some programmes are designed such that the requirements of the Other Professional Competencies category are taught and assessed entirely within modules or units designed to satisfy the requirements of other learning outcomes, whereas in other programmes the Other Professional Competencies requirements are taught and assessed in modules or units designed specifically for this purpose.

## 1.1. Learning Outcomes for First Cycle Degree Programmes

### **Geology, First Cycle - Underlying Basis**

Graduates having completed a First Cycle degree should have demonstrated the following capabilities:

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

### **11. Geology, First Cycle - Analysis, Design and Implementation**

1. Graduates having completed a First Cycle degree should have demonstrated the following capabilities:
2. Ability to create simple geological models
3. Some understanding of the complexity of geological problems and the feasibility of their solution
4. Understanding the need of a rational use of Earth resources
5. Basic ability in the formalisation and specification of problems whose solution involves the use of geological methods
6. Knowledge of appropriate solution patterns for geological problems

7. Basic ability to describe a solution at an abstract level
8. Knowledge of the range of applications of Geology
9. Ability to integrate field and laboratory evidence with theory following the sequence from observation to recognition, synthesis and modelling
10. Appreciation of issues concerning sample selection, accuracy, precision and uncertainty during collection, recording and analysis of data in the field and laboratory
11. Ability to formulate and test hypotheses

### **Geology, First Cycle - Technological, Methodological and Transferable Skills**

Graduates having completed a First Cycle degree should have demonstrated the following capabilities:

1. Basic ability to become familiar with new geological methods and technologies
2. Ability to select and use relevant analytic and modelling methods
3. Basic ability to apply appropriate technology and use relevant methods
4. Ability to use simple quantitative methods and to apply them to geological problems
5. Basic ability to independently analyze Earth materials in the field and laboratory and to describe, process, document and report the results
6. 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
7. Basic ability to combine theory and practice to complete geology tasks
8. Ability to undertake literature searches, and to use data bases and other sources of information
9. Ability to receive and respond to a variety of information sources (eg textual, numerical, verbal, graphical)
10. Ability to conduct appropriate experiments, to analyze and interpret data and draw conclusions
11. Basic awareness of relevant state-of-the-art technologies and their application
12. Basic ability to solve numerical problems using computer and non-computer based techniques
13. Basic knowledge of the application of information technology to geological science
14. Ability to use spreadsheet and word-processing software

## Geology, First Cycle - Other Professional Competencies

Graduates having completed a First Cycle degree should have demonstrated the following capabilities:

1. Ability to complete assigned tasks in a range of technical, economical and social contexts
2. Ability to learn and study including effective time management and flexibility
3. Awareness of the concept of professionalism and professional ethics
4. Knowledge of the economic, social, environmental and legal conditions expected in professional practice
5. Basic awareness of project management and business practices and understanding of their limitations
6. Ability to work effectively as an individual and as a member of a team
7. Recognition of the need for, and engagement in, self-managed and life-long learning
8. Ability to organise their own work independently
9. Basic ability to formulate an acceptable problem solution using geological methods in a cost-effective and time-efficient way
10. Basic knowledge in estimating and measuring costs and productivity
11. 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
12. Basic ability to prepare, process, interpret and present data, using appropriate qualitative and quantitative techniques and packages

## 1.2. Learning Outcomes for Second Cycle Degree Programmes

### **Geology, Second Cycle - Underlying Basis**

Graduates having completed a Second Cycle degree should have demonstrated the following capabilities:

1. Advanced knowledge and understanding of the principles of geology
2. Deeper knowledge of a chosen specialisation
3. Critical awareness of the forefront of their specialisation
4. Advanced understanding of Earth system relevant to their specialisation
5. Appreciation of the learning capacity needed to progress to independent research

### **Geology, Second Cycle - Analysis, Design and Implementation**

Graduates having completed a Second Cycle degree should have demonstrated the following capabilities:

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

### **Geology, Second Cycle - Technological, Methodological and Transferable Skills**

Graduates having completed a Second Cycle degree should have demonstrated the following capabilities:

1. Ability to design appropriate experiments, to analyze and interpret data and draw conclusions integrating knowledge from different disciplines, and handling complexity
2. Ability to use advanced, and develop customized, quantitative methods
3. Comprehensive understanding of applicable techniques and methods for a particular specialisation, and of their limits
4. Awareness of the limits of current knowledge and the practical application of the state-of-the-art technology
5. Knowledge and understanding of geology to create geological models of complex systems and processes
6. Basic ability to contribute to the further development of geology in practice and research

### **Geology, Second Cycle - Other Professional Competencies**

Graduates having completed a Second Cycle degree should have demonstrated the following capabilities:

1. Ability to produce independent work in their professional and scientific fields
2. Ability to manage and work effectively as leader of teams that may be composed of different disciplines and levels
3. Basic ability to work effectively and communicate in national and international contexts
4. Appreciation of the role of Geology in the development of knowledge, wealth creation and improving quality of life
5. Ability to evaluate performance as an individual and a team member
6. Ability to identify individual and collective goals and responsibilities and to perform in a manner appropriate to these roles
7. Ability to critically evaluate professional and research papers
8. Ability to plan an appropriate programme of continuing professional development

## 2. Guidelines for Programme Assessment and Programme Accreditation<sup>2</sup>

### 2.1. Guidelines for the Criteria and Requirements of Programme Assessment

Each geology programme for which a Higher Education Institution seeks accreditation or reaccreditation against Euro-Ages standards must be consistent with legal and national requirements and have in place:

- programme educational objectives consistent with the mission of the Higher Education Institution, the priorities of the HEI Department and the needs of relevant stakeholders (such as students, relevant employers, geology associations or societies, etc.) as well as programme learning outcomes consistent with the programme educational objectives and the specified programme learning outcomes for accreditation (cf. Sections 1.1 and 1.2)
- a curriculum and related processes which ensure achievement of the learning outcomes
- academic and support staff, facilities, financial resources and any cooperation agreements with industry, research institutions and/or other Higher Education Institutions necessary to deliver the learning outcomes
- appropriate forms of assessment which can validly attest to the achievement by graduating students of the programme learning outcomes
- a management system able to ensure the systematic achievement of the learning outcomes and the continual improvement of the programme.

Correspondingly, the guidelines for a programme assessment submitted for accreditation must at least specify the following items:

Relevant Information on the HEI offering the Programme

The Programme Needs, Objectives and Learning Outcomes

Relevant and Effective Educational Processes

Appropriate Resources and Partnerships

Adequate Assessment of the Educational Process and

An Effective (Quality-) Management System.

The detailed criteria to be assessed within this framework and the associated “requirements” listed in the following Table in the form of questions, valid for both FCD and SCD programmes, should be addressed when assessing a geology programme for accreditation.

---

<sup>2</sup> In general, assessment procedures should be in line with the Standards and Guidelines for Quality Assurance in the European Higher Education Area, The European Association for Quality Assurance in Higher Education (ENQA), Helsinki, 2005.

URL: [www.bologna-bergen2005.no/Docs/00-Main\\_doc/050221\\_ENQA\\_report.pdf](http://www.bologna-bergen2005.no/Docs/00-Main_doc/050221_ENQA_report.pdf) (2007-08-10).

Guidelines for Assessment	Criteria to be Assessed	Requirements	What the Self-Assessment Report (cf. Section 3.1) Should Give Evidence of and the Auditing Team Should Check
1. Needs, Objectives and Outcomes	1.1 Needs of the Stakeholders	Have the needs of relevant stakeholders (such as students, potential employers, geology societies, etc.) been explicitly identified? Do the graduates have clear labour market prospects?	Modes and periods of relationships with the stakeholders. Needs identified for each of the identified stakeholders. Placement of graduates on the labour market.
	1.2 Educational Objectives	Are the programme educational objectives consistent with the mission of the Higher Education Institution (HEI) and priorities of the HEI Department? Have relevant stakeholders been involved in formulating the objectives (such as students, employers, geology societies, etc.)? Are the programme educational objectives accessible to the relevant stakeholders? Are the programme educational objectives feasible, capable of implementation and valid? Are the programme educational objectives oriented towards currently foreseeable specialist developments? Which other (national, regional) standards have served as references to identify the educational objectives of the subject of study?	Programme educational objectives vs. mission of the HEI, priorities of the HEI Department and needs of the stakeholders. Transparency and publicity of the programme educational objectives. Existing standards that can be drawn on when identifying the fundamental principles underlying the subject of study.
	1.3 Programme Outcomes	Do the programme outcomes (knowledge, skills, competencies) acquired by the graduates cover the programme outcomes specified in the Euro-Ages Standards for accreditation? (cf. Section 1)	Analysis of how programme outcomes acquired by the graduates correspond to the specified Euro-Ages programme learning outcomes for accreditation (cf. Section 1).
		Are the programme learning outcomes (knowledge, skills, and competencies) acquired by the graduates consistent with the programme educational objectives?	Analysis of how far programme learning outcomes acquired by the graduates correspond to the programme educational objectives formulated by the HEI in the self-assessment report.
2. Educational Process	2.1 Planning	Is the curriculum adequate to enable the achievement of the defined programme educational objectives? Does the curriculum cover an educational level that corresponds to the targeted degree? Does the curriculum provide incentives for excellence? Do teaching staff, students and stakeholders such as potential employers consider the curriculum to be well-designed with respect to the targeted objectives? Does the curriculum encompass a sound didactic concept	Curriculum (syllabus, ECTS credits, credits for course work and personal study), its transparency and publicity. Definition/description of module' characteristics (credits, contents, specific learning outcomes, assessment methods of individual modules), their transparency and publicity. Integration of professional practice (external practical experience, laboratories, projects, etc.). Final examination, thesis, project, etc. Correspondence of curriculum and modules' characteristics to the programme objectives. The teaching methods and didactic means

Guidelines for Assessment	Criteria to be Assessed	Requirements	What the Self-Assessment Report (cf. Section 3.1) Should Give Evidence of and the Auditing Team Should Check
		taking into account student needs such as challenge, stimulation, and excitement? Is the content of the curriculum oriented towards expected specialist developments and existing standards for the subject? Does the HEI support students' mobility?	used to support the attainment of the objectives. Planning of the delivery. Teaching methods and techniques (fulltime, part time, parallel to or integrated in professional work, use of multimedia devices, etc.). Measures to promote excellence. Measures to take into account currently foreseeable specialist developments. Measures to promote the mobility of students on the programme.
	2.2 Delivery	Is teaching delivered according to planning?	Compliance of the delivery with the plans. Analysis of students' evaluation of taught modules. Analysis of students' and tutors' evaluation of external practical experiences. Analysis of students' mobility.
		Are counselling and support-workload provided for the students adequate to enable achievement of the modules' specific learning outcomes?	Number of staff and their workload for counselling and support to the students.
	2.3 Learning Assessment	Have examinations, projects and other assessment methods been designed to evaluate the extent to which students can demonstrate achievement of the learning outcomes of individual modules and programme outcomes throughout the programme and at its conclusion?	Examination papers and coursework (exam. papers and samples of assessed coursework, continuous assessments, project reports, to be presented during the visit). Written examinations / final theses (to be presented during the visit) Transparency and publicity of the standards and rules concerning the assessment of student performance.
3. Resources and Partnerships	3.1 Academic and Support Staff	Is the academic staff adequate to enable accomplishment of the programme outcomes? Is the academic staff deployed effectively in order to deliver an excellent curriculum? Does the HEI provide support for students learning activities at home (e.g. e-tutorials, accessibility of academic staff via email)?	Composition, competency and qualification of the teaching staff, and explanation of their 'adequacy'. Absolute and relative number of teaching staff (ratio student/full time teaching staff). Research (publications, participation in research projects, participation in conferences, etc.) and/or professional activities and consulting work of the teaching staff.
		Is the technical and administrative support staff adequate to enable achievement of the programme outcomes?	Number, composition, competency and qualification of the technical-administrative support staff.
	3.2 Learning environment	Are the lecture facilities adequate to enable the programme outcomes to be accomplished? Do they create a positive learning environment? Are research and development activities meaningfully	Lecture facilities and associated equipment available to students and explanation of their 'adequacy'.

Guidelines for Assessment	Criteria to be Assessed	Requirements	What the Self-Assessment Report (cf. Section 3.1) Should Give Evidence of and the Auditing Team Should Check
		integrated into the programme?	
		Are the computing facilities and course materials adequate to enable the programme outcomes to be accomplished?	Computing facilities available to students (e-learning tools, desktops/laptops, video projectors etc.).
		Are any laboratories, workshops and associated equipment needed for the programme adequate to enable the programme outcomes to be accomplished?	Laboratories, workshops and associated equipment available to students.
		Are the libraries and associated equipment and services adequate to enable programme outcomes to be accomplished? Do the libraries and associated equipment create a positive learning environment? Do conditions of, and access to, learning facilities, equipment and services support an effective learning process?	Libraries and associated equipment and services available to students. Academic guidance measures for prospective and existing students.  Explanation of their adequacy.
	3.3 Financial Resources	Are the available financial resources adequate to enable the programme outcomes to be accomplished? Are available financial resources used effectively in creating a positive learning environment?	Budget for teaching and support staff. Budget for running and upgrading facilities. Budget for training. Explanation of adequacy in relation to numbers on programme.
	3.4 Partnerships	Do the partnerships the HEI and the programme are participating in contribute to enabling the programme outcomes to be accomplished and facilitate the mobility of the students?	Local / regional / national / international industrial partnerships and cooperation agreements. Local / regional / national / international partnerships and cooperation agreements with research institutions. Local / regional / national / international cooperation agreements, programmes or measures with other Higher Education Institutions.
4. Assessment of Educational Process	4.1 Students	Do the students seeking enrolment in the programme have the right knowledge and attitudes to enable achievement of the programme outcomes in the expected time?	Entrance requirements. Admission requirements ( <i>only for programmes with admission quota arrangements</i> ).
		Do the results related to the students' study progress attest to the achievement of the programme learning outcomes in the expected time?	Students' study progress. Learning levels achieved. Success rates / retention rates, drop out rates and time taken to complete the programme. Number of students commencing each degree programme.
	4.2 Graduates	Do graduates enter an occupation corresponding to their qualification?	Number of graduates (preliminary / intermediate / final examinations passed). Time taken to enter the workforce.

Guidelines for Assessment	Criteria to be Assessed	Requirements	What the Self-Assessment Report (cf. Section 3.1) Should Give Evidence of and the Auditing Team Should Check
			Match between employment and education received.
		Do stakeholders (graduates, employers, etc.) confirm the achievement of the programme's educational objectives?	Graduates' opinions on the education received. Opinion of employers on the graduates' education.
5. Management System	5.1 Organisation and Decision-making Processes	Are the HEI's and programme's organisation and decision-making processes adequate for enabling the programme outcomes to be accomplished?	Documentation on HEI's and programme's organisational structures and decision-making processes (statutes, organisational charts, management of organisational processes, etc.). Positions of responsibility for the various actions to direct and control the educational process, their relationships of link and dependence. Existence and use of effective co-ordination mechanisms of decision-making processes, both horizontal and vertical. Existence and use of reliable information sources for decision-making. Some kind of summative statement explaining compliance.
	5.2 Quality Management System	Are the HEI's and programme's Quality Management Systems effective in enabling the achievement of the programme outcomes? Is its quality management approach reviewed regularly? Is this concept actually being implemented and used to make improvements? Is it capable of identifying deviations from the programme educational objectives? Does it enable the revision of the educational objectives? Is information on graduate placements, where applicable, systematically collected and evaluated?	HEI's and programme's policy and procedures for quality management. Evaluation during educational process (e.g. student surveys). Evaluation of the success of the degree programme (e.g. Data and statistics from graduate surveys, student surveys, studies on graduate employment).
		Are the delivery process', students' and graduates' results analysed and used to promote continual improvement of the programme?	Existence of a regulated and systematic process for continual programme review, development and improvement based on the analysis of the delivery processes, students' and graduates' results. Results of improvement actions.
		Are needs, objectives and outcomes, educational process, resources and partnerships, management system periodically re-examined?	Existence of a regulated, systematic and periodic process for re-examining needs objectives and outcomes, educational process, resources and partnerships, management system. Results of re-examination activity.

## 2.2. Guidelines for the Evaluation of Individual Requirements

When assessing the achievement of individual requirements for the programme review, a scale with at least the following three categories should be used:

- a. Acceptable without reservation
- b. Acceptable with adjustment requirements
- c. Unacceptable.

The outcome “acceptable” should be awarded to requirements, which have been fully met, even if improvements are still possible.

The outcome “acceptable with adjustment requirements” should be awarded to requirements, which have not been fully met, but are judged to be achievable within a reasonable period of time (as a rule no longer than half the regular full period of accreditation).

The outcome “unacceptable” should be awarded to requirements, which have not been met or fully met, and are judged not to be achievable within a reasonable period of time.

## 2.3. Guidelines for the Criteria of Programme Accreditation

A geology programme is accredited if it fulfils the requirements specified under Section 2.1.

To record the assessment outcome concerning the overall achievement of the requirements, a scale with at least the following three points should be used:

- a. Accredited without reservation
- b. Accredited with adjustment requirements
- c. Not accredited.

Accreditation without reservation, with possible specification of recommendations for the improvement of the programme, should be awarded to programmes for which all requirements are judged to be “acceptable”. In this case, accreditation should be awarded for the full period of accreditation (which should not exceed six years).

Accreditation with adjustment requirements, with specification of adjustments and the time in which these must be carried out, should be awarded if one or more requirements are judged to be “acceptable with adjustment requirements”. If a programme is rated as “accredited with adjustment requirements”, accreditation must be awarded for a shorter period of time than the full period of accreditation, after which compliance with the adjustment requirements is verified.

If any of the above conditions are not satisfied, the accrediting panel can recommend that accreditation be withheld.

### 3. Procedures for Programme Assessment and Programme Accreditation

This section lists the steps the programme assessment (based on self-assessment followed by external review) and programme assessment procedures should follow.<sup>3</sup> Individual accreditation agencies may add further requirements to respond to nationally and culturally distinctive features of Higher Education in geology and to ensure compliance with national legislation.

#### 3.1. Application by a Higher Education Institution (HEI)

The detailed self-assessment report and documentation is submitted before the visit of the assessing team (sufficient time should be allowed for review of the report).

The table in Section 2.1 may serve as guideline for the HEI in producing (and for members of the auditing team in reviewing) the self-assessment report and documentation. In any case, the self-assessment report should provide adequate information against all the questions listed in the table in Section 2.1, taking into account at least all the items listed in the last column of the table.

#### 3.2. Guidelines for the Procedure of Programme Assessment

##### 3.2.1. *Composition of Auditing Team*

The auditing team should consist of at least three persons, preferably more, representing a balance of relevant experience and expertise. At least two members of the auditing team should be academics, at least one a practitioner with a SCD or equivalent in geology. All members of the auditing team should be adequately trained in the conduct of the accreditation process. In this regard accreditation institutions should provide (or ensure provision of) adequate training.

To facilitate the dissemination of good practice in assessment, the accreditation agency should offer the option to include external observers from outside the respective economic region.

Each member of the auditing team must provide a statement indicating that no conflict of interest exists between the HEI Department at which one or more programmes are being accredited and the panel members. This statement should be received prior to any documentation being distributed.

##### 3.2.2. *Duration of the Auditing Visit*

The assessment process should last at least two days, including any preliminary meetings of the auditing team to assess the documentation and the visit to the HEI.

##### 3.2.3. *Structure of the Auditing Visit*

The visit should include:

- a preliminary meeting of the auditing team prior to the visit to identify what information is to be obtained during the visit
- a meeting with head of department / university

---

<sup>3</sup> In line with the Standards and Guidelines for Quality Assurance in the European Higher Education Area: URL: [www.bologna-bergen2005.no/Docs/00-Main\\_doc/050221\\_ENQA\\_report.pdf](http://www.bologna-bergen2005.no/Docs/00-Main_doc/050221_ENQA_report.pdf) (2007-08-10).

- a meeting with academic staff members
- a meeting with support staff members
- a meeting with a representative group of students
- a meeting with former students
- a meeting with relevant employers / industry / professional geology organisations representatives
- a visit of relevant facilities (libraries, laboratories, etc.)
- a review of project work, final papers and other assessed work (with regards to the standard and modes of assessment as well as to the learning achievements of the students)
- feedback by the auditing team at the end of the visit.

### 3.3. Guidelines for the Procedure of Programme Assessment

#### 3.3.1. *Verification and Validation of the Report by the Accreditation Agency/Commission*

The auditing team prepares, and agrees on an assessment report. The assessment report is then submitted to the HEI to check for factual errors and (should the HEI desire) submit a statement on the report. The statement of the HEI is transmitted to the members of the auditing team for review of the assessment report and formulation of recommendation concerning the accreditation decision.

#### 3.3.2. *Decision on Accreditation*

The final decision on accreditation should be taken by a designated board of the accreditation Agency. The accreditation decision must clearly define the period of validity (the duration of which should not exceed a maximum of six years) and whether it refers to year of entry or year of graduation. After the limited validity of the accreditation has expired, the programme must be submitted to re-accreditation.

The accreditation decision is then communicated to the HEI.

#### 3.3.3. *Publication*

The list of accredited programmes must be made available to the public by each accreditation institution. The following section (Section 4) presents a recommended template for the publication; it will have to be adapted to national legislation.

#### 4. Recommended Template for Publication of Results

<b>Higher Education Institution</b> (name in original language and in English)	
<b>Country</b>	
<b>State/Province</b> (where applicable)	
<b>Name of the Programme</b> (name in original language and in English)	
<b>Degree Awarded</b>	
<b>Qualification Level</b> (First Cycle / Second Cycle)	
<b>Programme Objectives; Profile</b> (where applicable)	
<b>Programme Duration</b> (Semesters; in case of “terms” of different length, indicate them and the equivalent in semesters)	Semesters
<b>Total Number of ECTS Credits Awarded</b>	ECTS cp
<b>Curriculum Analysis</b> (% and credits): <ul style="list-style-type: none"> <li>◦ geology fundamentals</li> <li>◦ advanced engineering subjects (including final thesis)</li> <li>◦ mathematics / natural sciences fundamentals</li> <li>◦ interdisciplinary contents</li> </ul>	
<b>Brief Description of the Programme</b>	
<b>Examples of Very Good Practice</b> (where applicable)	
<b>Accredited without / with Adjustment Requirements</b>	
<b>Adjustment Requirements</b> (where applicable)	
<b>Accredited by</b> (agency, country)	
<b>Accredited</b> (from ... to ...)	

## **5. Appeal Mechanism**

Agencies or other national competent authorities that make accreditation decisions on the basis of the Euro-Ages Standards and Criteria should have an appeals procedure. The nature and form of the appeals procedure should be determined in the light of the constitution of each agency.

It should be evident from the documentation to what extent the appeals system is based on a hearing process through which the agency can provide those under evaluation a means to comment on and question the outcomes of the evaluation. Basically, the agency should provide evidence that the appeals system provides for those under evaluation an opportunity to express opinions about evaluation outcomes.

**ANNEX**

**COMMENTARY**

**ON THE**

**QUALIFICATION FRAMEWORK**

**AND**

**ACCREDITATION CRITERIA**

**FOR**

**GEOLOGY STUDY-PROGRAMMES IN EUROPE**

**16. AUGUST 2010**

## **I. Objectives of the Euro-Ages Project**

Euro-Ages aims to create a framework for setting up a European system of Standards for assessing geology education at the First Cycle and Second Cycle level (as defined within the Bologna process).

Based on the establishment and approval of this set of standards, the main objectives of the Euro-Ages Project are:

- to provide an appropriate “European Quality Label” for accredited educational programmes in geology
- to provide a basis for comparing educational qualifications in geology in the European Higher Education Area (EHEA)
- to facilitate mutual transnational recognition by programme validation and certification
- to facilitate recognition of accredited degrees in geology higher education in accordance with the EU Directives and other agreements
- thus, together with other field-specific standards and criteria, to contribute to the harmonisation of the European Higher Education Area
- to support the mobility of geology graduates
- to contribute to international transparency - as one of the objectives of the Bologna Declaration
- to support improvements to the quality of geology programmes in general

## **II. Scope and Application of the Euro-Ages Framework Standards**

The Euro-Ages Framework Standards are informed in particular by four documents at European level, which are concerned with reforming the European higher education systems. These are:

- The ‘Framework for Qualifications of the European Higher Education Area’, agreed by the Bergen Conference in May 2005
- The Dublin Descriptors referred to in the above Framework for Qualifications
- The ENQA ‘Standards and Guidelines for Quality Assurance in the European Higher Education Area’, agreed by the Bergen Conference as ‘European Quality Assurance Standards’

- European Qualifications Framework for lifelong learning proposed by the European Commission for a Recommendation of the European Parliament and of the Council, COM(2006) 479 final.

[http://ec.europa.eu/education/policies/educ/eqf/com\\_2006\\_0479\\_en.pdf](http://ec.europa.eu/education/policies/educ/eqf/com_2006_0479_en.pdf) (2007-04-27)

While pursuing a Europe-wide approach, the Euro-Ages Framework Standards for Accreditation are not intended to compete with or replace national guidelines for geology courses. They shall augment them by providing Europe-wide reference points for outcomes of degree programmes in geology. Thus, they provide a means for demonstrating the mutual compatibility of the accredited programmes.

The Euro-Ages Standards may be applied in two ways: First, in countries where a national system for assessing geology programmes already exists, recognition of national accreditation certificates as having achieved the proposed EU standards can be immediate if the existing arrangements are consistent with these Framework Standards.

Alternatively, in countries where no national geology accreditation system yet exists, the Framework Standards can be directly applied to relevant programmes, or used as a starting basis for the Standards and Procedures of newly created Accreditation Agencies.

The Framework Standards describe the programme (desired learning-) outcomes of an accredited programme but allow for considerable variation in the individual emphasis of the higher education programmes. They do not address conditions of access to programmes: these are handled by Higher Education Institutions (HEIs), in accordance with any national regulations and/or requirements including new and innovative programmes.

As regards their scope, the Euro-Ages Standards are intended to:

- be widely applicable and inclusive, enabling eligibility of a wide range of possible approaches to geology higher education
- handle the diversity of content of geology degree programmes
- be relevant for (academic) geology study programmes leading to a First or to a Second Cycle Degree
- facilitate in particular accreditation of trans-national joint- and double degree programmes.

The Euro-Ages Standards shall not explicitly refer to, but on the other hand shall not exclude, programmes delivered by e-learning (distance learning), lifelong learning or any other type of learning delivery.

### **III. Professional Recognition of Geology Degrees**

The ultimate goal of the Euro-Ages Project is to facilitate Europe-wide professional recognition by the competent national authorities of the geology degrees awarded by study programmes accredited on the basis of the programme outcomes and accreditation criteria defined in the Euro-Ages Framework Standards.

The Euro-Ages Standards are concerned only with the accreditation of the education base of the initial professional formation. It is for the appropriate authority in each country to determine whether a programme is of sufficient quality and relevance as the education base for registration or qualification for professional practice in that country, or if further education, training or industrial experience is necessary. The Euro-Ages Quality Label is intended to assist such decisions, and particularly support cross-recognition of those that involve transnational recognition.

It can be expected that achievement of geology degrees accredited to the Euro-Ages Standard as FCD and SCD, possibly with additional requirements, will usually lead, in due course, to professional practice at levels (d) or (e) of professional qualifications, defined in Article 11, Directive 2005/36/EC of the European Parliament and of the Council on the recognition of professional qualifications (September 07, 2005).

## IV. Glossary

This glossary is informed by the official documents of the Bologna Process listed under Section 4.2. Furthermore, the concept definitions show meanings relevant to the context of geology higher education and the purpose of the Euro-Ages Project. Terms that are normally used in more generic contexts (e.g. the EHEA Framework for Qualifications) have been - where applicable – made more specific to this context.

- *Accreditation*

Accreditation of a geology degree programme is the primary result of a process used to ensure the suitability of that programme as the entry route to the geology profession. Accreditation involves a periodic assessment against accepted standards of geology education. It is essentially based on a peer review process, undertaken by appropriately trained and independent teams comprising peers from both academia and geology practice. The process normally involves both scrutiny of data and a structured visit to the Higher Education Institution (HEI) running the programme.

- *Accreditation Agency*

An Accreditation agency in the context of Euro-Ages is an independent, national and legally recognized body that develops educational standards, criteria and procedures and conducts expert visits and peer reviews to assess whether or not those criteria are met. It is self-evaluated and externally reviewed according to the European Standards and Guidelines.

- *Accreditation criteria*

Accreditation criteria in the context of the Euro-Ages Framework Standards denote the criteria for assessment and Accreditation of geology study programmes.

- *Auditing visit*

An auditing visit is understood as an on-site visit within the scope of an Accreditation or assessment process to verify the content of a submitted self-assessment report.

- *Assessment*

Assessment is the process of systematic gathering, quantifying and using information to judge the effectiveness and adequacy of something against a published standard. It implies evaluation of core activities. It is a necessary basis for a formal Accreditation decision.

- *Competency*

Competency is the proven ability to use knowledge, skills and personal, social and / or methodological abilities, in work or study situations and in professional and / or personal development.

- *Course*

Synonym for →Programme (or: degree programme)

- *Credit*

A quantified means of expressing the volume of learning based on the achievement of learning outcomes and their associated workload.

- *Curriculum*

A curriculum is a programme of courses to be taken in pursuit of a degree. It provides information on educational processes of a study programme. It spells out which goals and objectives should be achieved, which topics should be covered and which methods are to be used for learning, teaching and evaluation.

- *Cycle*

the three sequential levels identified by the Bologna Process (first cycle, second cycle and third cycle) within which all European higher education qualifications are located.

- *Educational Objectives*

Educational objectives that are defined by the HEI in terms of Learning outcomes (knowledge, skills, and competencies) to be achieved by the students in the course of a study programme. The particular modules of the study programme are conceived that way that they enable students to achieve the overarching programme educational objectives. The focus of assessment of the study programme lies on

- whether the study programme enables the achievement of the programme educational objectives, respectively, if the educational objectives correspond to the →Programme (Learning) Outcomes
- whether the modules enable the achievement of their →Specific Learning Outcomes

- *Discipline*

A discipline is a field of study or knowledge, such as physics, geology and biology and - in the context of this document - →**Fehler! Verweisquelle konnte nicht gefunden werden.**

- *Europe/European*

Europe/European refers to those countries that are signatories to the Bologna Process, whilst 'national' is used to describe the contexts within each of those countries or education systems.

- *European Higher Education Area*

The construction by 2010 of a European Higher Education Area (EHEA) where students and staff may move freely and have their qualifications recognised is goal of the Bologna Process. The Bergen Communiqué states that the EHEA is structured around three cycles, where each level has the function of preparing the student for the labour market, for further competency building and for active citizenship. The overarching framework for qualifications, the agreed set of European standards and guidelines for quality assurance and the recognition of degrees and periods of study are also key characteristics of the structure of the EHEA. Furthermore, the social dimension of the Bologna Process is a constituent part of the EHEA.

- *First and Second Cycle Degree*

In accordance with the EHEA framework, the Accreditation process will distinguish between programmes of the First and Second Study Cycles, defined in accord with the "Dublin Qualification Descriptors", developed by the Joint Quality Initiative and the Report "A Framework for Qualification of the European Higher Education Area", both documents endorsed by the Bergen Ministerial meeting of May 2005.

The terms "First Cycle Degree" and "Second Cycle Degree" (and their acronyms FCD and SCD), are used to avoid any possible misinterpretation associated with the use of specific terms such as Bachelor, Master, etc., that are used with different meanings in different countries of the EHEA. In this context, the term "Cycle" is used to describe a study programme leading to an academic degree while the term "Degree" describes a qualification awarded to an individual by a recognised HEI after successful completion of a study programme. In a credit accumulation system the programme is completed through the accumulation of a specified number of credits awarded for the achievement of a specific set of →Learning outcomes.

- *Framework for Qualifications of the European Higher Education Area*

An overarching framework that makes transparent the relationship between European national higher education frameworks of qualifications and the →Qualifications (higher education) they contain. It is a mechanism of interlinking national frameworks.

- *Knowledge*

Knowledge is the outcome of the collection and assimilation of information through learning.

- *Learning outcomes*

Statements of what a learner is expected to know, understand and/or be able to do at the end of a period of learning. In the context of Euro-Ages, the term “learning outcomes” refers to capabilities achieved through specific →Modules, seminars, lectures or other sub-periods of learning within a study programme. Competencies, skills and knowledge gained by the successful completion of a geology study programme are referred to as →Programme (Learning) Outcomes.

- *Module*

A module forms a package of achievements with coordinated content, which is assessed jointly within the examination framework during the course. The creation of modules is oriented towards the →(Programme) Educational Objectives. Each module results in a set of achievements (→Specific Learning Outcomes) that are assessed jointly within an examination during the study programme. A module is thus the smallest unit for which ECTS credits are awarded.

- *Programme (or: degree programme)*

Integrated course of study leading to an academic degree. In the context of Euro-Ages, the term is used to describe a programme leading to a First or Second Cycle Degree as referred to in the Bologna Declaration. “Course” is often used interchangeably with Programme.

- *(Programme) Educational Objectives*

→Educational Objectives

- *Programme (Learning) Outcomes*

(Statements on) the specific →Competences, →Skills and →Knowledge gained by the successful completion of a geology study programme. Programme Outcomes are developed on the basis of the qualifications required from graduates of these programmes to enter a career in the geology profession. An important assessment requirement is that the programme outcomes are consistent with the →(Programme) Educational Objectives.

The programme outcomes defined in the present Euro-Ages Framework Standards are designed to be compatible with the general framework outlined in the “Framework for Qualifications of the European Higher Education Area” prepared by the Bologna Follow-up Group on the basis of the „Dublin Qualification Descriptors“. However, the descriptors for programme outcomes in the Euro-Ages Framework Standards are more specific with respect to the competencies required for the geology profession.

- *Qualification descriptors*

Generic statements of the outcomes of study. They provide clear points of reference that describe the main outcomes of a qualification often with reference to national levels. In the context of the Euro-Ages Framework Standards, the term programme (learning) outcomes is used equivalently to Qualification Descriptors.

- *Qualifications (higher education)*

Any degree, diploma or other certificate issued by a competent authority attesting that particular learning outcomes have been achieved, normally following the successful completion of a recognised higher education programme of study.

- *Reference Points*

Non-prescriptive indicators that support the articulation of qualifications, learning outcomes and/or other related concepts.

The Euro-Ages Framework Standards are intended to provide a reference point for those developing or reviewing national Accreditation systems for geology education. It does not aim at competing with or replacing national guidelines for geology courses.

- *Skills*

Skills are the ability to apply →Knowledge and use know-how to complete tasks and solve problems.

- *Specialisation*

In the context of the Euro-Ages Programme (Learning) Outcomes, the term specialisation refers to the subject of a study programme as part of the broader discipline of geology.

- *Specific Learning Outcomes*

Statements of what the student knows, respectively what he is expected to know, understand and/or be able to do after having completed a unit or period of learning, such as, in the context of Euro-Ages, a →Module. The specific learning outcomes are outlined in the module descriptions and contribute to the achievement of the overall →Educational Objectives.

- *Syllabus*

A course outline that delineates course requirements, grading criteria, course content, faculty expectations, deadlines, examination dates, grading policies, and other relevant course information.

- *Workload*

a quantitative measure of the learning activities that may feasibly be required for the achievement of the learning outcomes (e.g. lectures and seminars, practical work, private study, information retrieval, research, examinations).

- *Quality Management System*

A Quality Management System is an ongoing process of assessing, guaranteeing, maintaining and improving the quality of a higher education institution or a programme. It is assumed that all programmes to be Euro-Ages-accredited fulfil the criteria set out in the ENQA 'Standards and Guidelines for Quality Assurance in the European Higher Education Area'. These Standards are concerned with ensuring the quality of the educational process, whereas Euro-Ages Framework Standards regard the content and standard of geology education for professional qualification. Thus, the two overlap and have some common concerns but they are not the same. It has been checked that there is no inconsistency between the Euro-Ages Framework Standards, the ENQA Standards, or any other relevant document.

## **V. Sources**

- A1 EUR-ACE Framework Standards for the Accreditation of Engineering Programmes – Final 17/11/2005.  
URL: [http://www.feani.org/EUR\\_ACE/reports\\_accrstand.htm](http://www.feani.org/EUR_ACE/reports_accrstand.htm) (2007-08-10).
- A Framework for Qualifications of the European Higher Education Area, published by the Ministry of Science, Technology and Innovation, Copenhagen, February 2005.  
URL: [http://www.bologna-bergen2005.no/EN/BASIC/050520\\_Framework\\_qualifications.pdf](http://www.bologna-bergen2005.no/EN/BASIC/050520_Framework_qualifications.pdf) (2007-08-10).
- Bologna Declaration: The European Higher Education Area. The Bologna Declaration of 19 June 1999. Joint declaration of the European Ministers of Education.  
URL: [www.bologna-bergen2005.no/Docs/00-Main\\_doc/990719BOLOGNA\\_DECLARATION.PDF](http://www.bologna-bergen2005.no/Docs/00-Main_doc/990719BOLOGNA_DECLARATION.PDF) (2007-08-10).
- Standards and Guidelines for Quality Assurance in the European Higher Education Area, The European Association for Quality Assurance in Higher Education (ENQA), Helsinki, 2005.  
URL: [www.bologna-bergen2005.no/Docs/00-Main\\_doc/050221\\_ENQA\\_report.pdf](http://www.bologna-bergen2005.no/Docs/00-Main_doc/050221_ENQA_report.pdf) (2007-08-10).

- Glossary for the Bologna Process, Norwegian Secretariat of the Bologna Follow-up Group, 2005  
URL: <http://www.bologna-bergen2005.no/EN/Glossary/Glos1.HTM> (2007-08-10).
- European Qualifications Framework for lifelong learning proposed by the European Commission for a Recommendation of the European Parliament and of the Council, COM(2006) 479 final.  
URL: [http://ec.europa.eu/education/policies/educ/eqf/com\\_2006\\_0479\\_en.pdf](http://ec.europa.eu/education/policies/educ/eqf/com_2006_0479_en.pdf) (2007-08-10).

**The Euro-Ages Partner Institutions are:**

ASIIN Consult GmbH  
Düsseldorf, Germany  
[www.asiin-consult.de](http://www.asiin-consult.de)



EFG - European Federation of Geologists  
Brussels, Belgium  
[www.eurogeologists.de](http://www.eurogeologists.de)



ICOG - Official Spanish Association of  
Professional Geologists  
Madrid, Spain  
[www.icog.es](http://www.icog.es)



MFT - Hungarian Geological Society  
Budapest, Hungary  
[www.foldtan.hu](http://www.foldtan.hu)



SACO - Swedish Natural Scientists Association  
Stockholm, Sweden  
[www.saco.se](http://www.saco.se)

