Programme syllabus

Master's Programme, Geodesy and Geoinformatics, 120 credits
Masterprogram, geodesi och geoinformatik
120.0 credits

Valid for students admitted to the education from autumn 11 (HT - Autumn term; VT - Spring term).

This is a translation of the Swedish, legally binding, programme syllabus.

Programme objectives

The information is valid for students who started the program academic year 2011/2012. Later decisions may affect year 2 in the program. Please look at www.kth.se/studies?l=en_UK for further information.

Geoinformatics is the technology for acquisition, analysis, storage, visualisation and utilization of geospatial data using information technology and has been identified by the U.S. Government as one of the three most important emerging and evolving fields. The science of geodesy provides the foundation for all applications where the geographic position, size or volume of different objects is needed. The programme will focus on defining and maintaining geodetic reference systems, collecting, structuring and visualizing geospatial data and the development and application of Geographic Information Systems (GIS).

Knowledge and understanding

After completing the programme the students will

- have the ability to understand how the national and global reference systems are built and how can they be used
- understand the principle and process of positioning using different terrestrial and satellite technologies
- have knowledge about structuring, storing, analysing and visualisation of geospatial data

Skills and abilities

After completing the programme, the students will acquire practical skills to

- define and use geodetic coordinate systems and perform transformation between different systems
- carry out surveying tasks by terrestrial and satellite-based methods
- process the measured data using appropriate mathematical tools
- structure and visualize geospatial data using information technology
- build Geographic Information Systems (GIS)

The programme also aims to help students develop capability to conduct independent, scientific research through critical analysis and synthesis. Students will receive training in scientific communication and presentation, both oral and in written form. Students will also learn how to work in project form and work in groups.

Ability to make judgements and adopt a standpoint

After completing the programme, the students will be able to
• choose proper method for data collection and analysis according to the requirements of given problem
• assess the possibilities and limitations of geographic information systems and their applications in different scientific and technological branches
• identify the needs for new or the further development existing methods, technologies and algorithms used in the process of collection, storing, analysing and visualisation of geospatial data

Extent and content of the programme

The programme, taught entirely in English, will run for two years and include 90 credits of course work and 30 credits for the final degree project. The education level of the programme is at the second cycle.

Eligibility and selection

General admission requirements

The general admission requirements are the same for all programmes General admission requirements (http://www.kth.se/studies/master/application?l=en)

“Selection criteria for the master programme are: previous BSc/MSc degree, university, grade of previous course work and relevant working experiences. Documented excellence in mathematics or computer programming and basic knowledge in surveying, mapping or GIS are recognized as merits.”

Specific admission requirements

The specific requirements may be assessed as not fulfilled if

1. the average grade is in the lower third on the grading scale used (above pass level)
2. the degree awarding institution is not considered to meet acceptable quality standards by the authorities of the country in which the institution is located
3. the degree does not qualify for admission to equivalent Master level in the country where the degree is awarded

Specific admission requirements for this master's programme are:

- a bachelors degree within civil engineering, environmental engineering, geodesy, GIS, computer science or other subject relevant to the scope of the programme.
- good knowledge and practical skills in computer science, especially in computer programming.
- good knowledge in mathematics including mathematical analysis, linear algebra and mathematical statistics.

The students are required to be proficient in English, equivalent to English studies at upper secondary level (post-16) in Sweden, called English B. Equivalent knowledge in English can be verified through an internationally recognised test as for example:

- IELTS (an overall mark of 6.5 and no section below 5.5)
- TOEFL.

Implementation of the education

Structure of the education

The programme consists of two academic years. Each academic year is divided into two semesters and four periods. The programme includes 90 credits of course work and 30 credits for the final degree project.

Courses

The programme is course-based. Lists of courses are included in appendix 1.
**Grading system**

Courses in the first and the second cycle are graded on a scale from A to F. A-E are passing grades, A is the highest grade. The grades pass (P) and fail (F) are used for courses under certain circumstances.

**Conditions for participation in the programme**

To be enrolled in the programme, a student must be duly accepted into the programme. Notification about the admission is issued by studera.nu. Students must register at the program coordinator latest September 15. Students should select courses before the start of each semester. Course selection should observe the prerequisite condition stipulated for each course.

At the beginning of a course, a student should sign on a participation list in order to be registered for the course. A student must have earned at least 45 credits of finished courses after the first year of study, before being allowed to continue studies in the following semester. Students should have completed 60 credits of finished courses before starting the final degree project. Examiner of the degree project can decide that the student need more than 60 credits before starting the final degree project.

**Recognition of previous academic studies**

The Royal Institute of Technology has a policy for recognising previous academic studies. The decision on recognising documented results from similar education at other universities is taken by the vice dean of education at the School of Architecture and the Build Environment upon application by the student.

**Studies abroad**

It is presently not possible for students of this master programme to study abroad in the first three semesters. However, students are allowed to carry out the master’s degree project abroad after approval by the programme coordinator.

**Degree project**

Degree project is administratively registered as a course of 30 credits. It is intended to give students an opportunity to apply knowledge and skills to solve scientific problems in geodesy, photogrammetry, geoinformatics and remote sensing. One of the main objectives is to help students develop capability to conduct independent, scientific research characterized by critical analysis and synthesis.

Through the degree project, a student will learn how to analyze, formulate and define scientific problems, find and evaluate possible solutions and finally present the results in a thesis which shall be presented and defended in a public seminar. In addition, students will get practical training in scientific communication and presentation, both orally and in written form. Students should have completed 60 credits of courses before starting the final degree project.

A proposal to degree project can be worked out by the student or together with supervisors at or outside KTH. Before carrying out the degree project work, a project plan must be submitted and approved by the examiner. Degree project will be graded based on the ECTS scale: A-F.

**Degree**

Students who have completed programme courses of at least 90 credits as well as the final degree project of 30 credits will be awarded a "Teknologie masterexamen", translated into English as "Degree of Master of Science (two years)".

Please note that this degree do not correspond to the Swedish degree "Civilingenjör".

Appendix 1 - Course list
Appendix 2 - Programme syllabus descriptions
Appendix 1: Course list

Master's Programme, Geodesy and Geoinformatics, 120 credits (TGEGM), Programme syllabus for studies starting in autumn 2011

**General courses**

**Year 1**

**Mandatory courses (45.0 credits)**

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>AG2411</td>
<td>GIS Architecture and Algorithms</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AG2412</td>
<td>Geovisualisation</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AG2414</td>
<td>Spatial Analysis</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AH2921</td>
<td>Adjustment Theory</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AH2922</td>
<td>Map Projections and Reference Systems</td>
<td>9.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AH2923</td>
<td>Global Navigation Satellite Systems (GNSS)</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>

**Optional courses**

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>AG2413</td>
<td>Digital Image Processing and Applications</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AG2425</td>
<td>Spatial Databases</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AH2914</td>
<td>Physical Geodesy</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AH2915</td>
<td>Laser Scanning Technology</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
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</table>

**Year 2**

**Mandatory courses (7.5 credits)**

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>AK2036</td>
<td>Theory and Methodology of Science with Applications (Natural and Technological Science)</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>
### Conditionally elective courses

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>AG2417</td>
<td>Web and Mobile GIS</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AG2421</td>
<td>A GIS Project</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AG242X</td>
<td>Degree Project in Geoinformatics, Second Cycle</td>
<td>30.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AH2916</td>
<td>Integrated Navigation</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AH2917</td>
<td>Advanced Theory of Errors</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AH2924</td>
<td>Engineering Surveying</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AH292X</td>
<td>Degree Project in Geodesy, Second Cycle</td>
<td>30.0</td>
<td>Second cycle</td>
</tr>
</tbody>
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Appendix 2: Specialisations

Master's Programme, Geodesy and Geoinformatics, 120 credits (TGEGM), Programme syllabus for studies starting in autumn 2011

This programme has no specialisations.