Curriculum for the Master’s Programme in Surveying, Planning and Land Management

(Cand.tech.)

Aalborg University
September 2017
Preface

Pursuant to Act 261 of March 18, 2015 on Universities (the University Act) with subsequent changes, the following curriculum for the Master's programme in Surveying, Planning and Land Management is stipulated. The programme also follows the Joint Programme Regulations and the Examination Policies and Procedures for The Technical Faculty of IT and Design, The Faculty of Engineering and Science, and The Faculty of Medicine.

Commencement of this curriculum is 1. September 2017 (only 1\textsuperscript{st} semester).
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Chapter 1: Legal Basis of the Curriculum, etc.

1.1 Basis in ministerial orders
The Master’s program (cand.geom.) in Surveying, Planning and Land Management is accordance with the Ministry of Higher Education and Science’s Order no. 1061 of June 30, 2016 on Bachelor’s and Master’s Programmes at Universities (the Ministerial Order of the Study Programmes) and Ministerial Order no. 1062 of June 30, 2016 on University Examinations (the Examination Order). Further reference is made to Ministerial Order no. 258 of March 18, 2015 (the Admission Order) and Ministerial Order no. 114 of February 3, 2015 (the Grading Scale Order) with subsequent changes.

1.2 Faculty affiliation
The Master’s programme falls under The Technical Faculty of IT and Design.

1.3 Board of Studies affiliation
The Master’s program falls under the Board of Studies for Planning, Geography and Surveying (Studienævn for Planlægning, Geografi og Landinspektøruddannelsen), that falls under the School of Architecture, Design and Planning.

1.4 Censorship
The Master’s program falls under the Danish “Censorkorps for Landinspektøruddannelsen”.
Chapter 2: Admission, Degree Designation, Program Duration and Competence Profile

2.1 Admission
Applicants with a legal claim to admission (retnskrav):
- Bachelor of Science in Surveying, Planning and Land Management from Aalborg University.

Applicants with one of the following degrees are entitled to admission:
- Bachelor’s degree in Geography, Copenhagen University
- Bachelor’s degree in Geography, Roskilde University

Applicants without legal claim to admission:
Students with another Bachelor’s degree may, upon application to the Board of Studies, be admitted after a specific academic assessment if the applicant is deemed to have comparable educational prerequisites. The University can stipulate requirements concerning conducting additional exams prior to the start of study.

All international students applying to Aalborg University must document English language qualifications comparable to an ‘English B level’ in the Danish upper secondary school (minimum average grade 02).

2.2 Degree designation in Danish and English
The Master’s program entitles the graduate to the Danish designation:
Cand.tech. i landinspektørvidenskab med specialisering i:
- opmåling og kortlægning,
- arealforvaltning og planlægning eller
- geoinformatik

The English designation is:
Master of Science (MSc) in Surveying, Planning and Land Management with specialisation in:
- Surveying and Mapping
- Land Management, or
- Geoinformatics

2.3 The program's specification in ECTS credits
The Master’s program is a 2-year, research-based, full-time study program. The program is set to 120 ECTS credits.

2.4 Competence profile on the diploma
The following competence profile will appear on the diploma:

A Candidatus graduate has the following competency profile:
A Candidatus graduate has competencies that have been acquired via a course of study that has taken place in a research environment.
A Candidatus graduate is qualified for employment on the labour market on the basis of his or her academic discipline as well as for further research (PhD programmes). A
Candidatus graduate has, compared to a Bachelor, developed his or her academic knowledge and independence so as to be able to apply scientific theory and method on an independent basis within both an academic and a professional context.

2.5 Competence profiles of the program’s specialisations

2.5.1 Competence profile of the Master’s program (cand.tech.) with specialisation in Surveying and Mapping

The graduate of the Master’s program must:

Knowledge

- be knowledgeable about technologies and theories/methods for collecting spatial data.
- be knowledgeable about theories/methods for processing/integrating spatial data.
- be knowledgeable about theories/methods for assessing the quality of spatial data.

Skills

- master theories/methods related to collecting/processing/integrating spatial data
- be able to evaluate theories/methods related to collecting/processing/integrating spatial data.
- be able to identify problems related to collecting/processing/integrating spatial data.
- be able to assess/analyse problems related to collecting/processing/integrating spatial data.
- be able to suggest solutions to problems related to collecting/processing/integrating spatial data in consideration of various criterions (e.g. completeness, precision, resource consumption).
- be able to assess the quality of the suggested solutions.
- be able to assess the quality of spatial data coming from various sources.
- be able to communicate/discuss problems related to collecting/processing/integrating spatial data with both peers and non-specialists.
- be able to give advice regarding problems related to collecting/processing/integrating spatial data.

Competencies

- be able to master selected data collecting technologies.
- be able to master general skills required to solve typical data collecting/processing/integrating tasks.
- be able to initiate/plan/implement cross-disciplinary working relationships.
- be able to ensure his/her further professional development.
2.5.2 Competence profile of the Master’s program (cand.tech.) with specialisation in Land Management

The graduate of the Master’s program:

Knowledge
- Has knowledge in land management based on research and practices concerning development and regulation of property and land use, spatial development and planning, land economics and land governance.
- Has knowledge in spatial planning and governance based on state-of-the-art international research.
- Understands legal issues concerning real property and legal and economic issues concerning public intervention in the property market.
- Understands legal issues concerning the use of and public interventions of private property, based on the highest research in the field.
- Can understand and, on a scientific basis, reflect over the knowledge areas and identify scientific as well as practical problems or challenges regarding urban and rural development. Including how this relates to societal values and norms of relevance for land management.

Skills
- Excels in main theories that relate to the knowledge areas and in scientific methods and tools and general skills related to planning and management activities for urban and rural development.
- Can apply, evaluate and select among the scientific theories, methods and tools regarding planning and land management for urban and rural development - and on a scientific basis, advance new analyses and solutions
- Can communicate research-based knowledge and discuss professional and scientific problems with both peers and non-specialists concerning planning and land management for urban and rural development

Competencies
- Can apply and combine theories, methods and tools to manage work and development situations that are complex, unpredictable and require new solutions.
- Can independently initiate and implement discipline-specific and interdisciplinary cooperation and assume professional responsibility on relevant aspects of planning and land management for urban and rural development
- Can independently take responsibility for own professional development and specialisation on planning and land management for urban and rural development
2.5.3 Competence profile of the Master's program (cand.tech.) with specialisation in Geoinformatics

The graduate of the Master's program:

Knowledge

- Has knowledge in geospatial information technology, distributed geo-services, 3D-visualisation, spatial data infrastructure, and geocomputation based on the highest international research in the subject areas
- Can understand and, on a scientific basis, make reflections on the knowledge and identify scientific problems regarding the development of spatial enabled services, advanced geovisualisation technologies, spatial data infrastructures, geocomputation, image processing and spatial decision support systems

Skills

- Excels in the scientific methods and tools and general skills related to all aspects of geographic information
- Can evaluate and select among the scientific theories, methods, tools regarding data storage, flow, processing, and visualisation - and on a scientific basis, advance new analyses and solutions
- Can communicate research-based knowledge and discuss professional and scientific problems with both peers and non-specialists on geographic information technology.

Competencies

- Can use advanced geospatial theories, methods and tools to manage work and development situations that are complex, unpredictable and require new solutions.
- Can independently initiate and implement discipline-specific and interdisciplinary cooperation and assume professional responsibility on all aspects of geographic information technology.
- Can independently take responsibility for own professional development and specialisation on geographic information
Chapter 3: Content and Organization of the Program

The program is structured in modules and organized as a problem-based study. A module is a program element or a group of program elements, which aims to give students a set of professional skills within a fixed time frame specified in ECTS credits, and concluding with one or more examinations within specific exam periods that are defined in the curriculum.

The program is based on a combination of academic, problem-oriented and interdisciplinary approaches and organized based on the following work and evaluation methods that combine skills and reflection:

- lectures
- classroom instruction
- project work
- workshops
- exercises (individually and in groups)
- teacher feedback

By prior agreement with the study board, it is possible for students to attend modules offered at other relevant master programmes.
3.1 Overview of the program
All modules are assessed through individual grading according to the 7-point scale or Pass/Fail. All modules are assessed by external examination (external grading) or internal examination (internal grading or by assessment by the supervisor only).

All modules are taught in English.

1st Semester is common semester for students on both Specialisation in Surveying and Mapping and Specialisation in Land Management and Specialisation in Geoinformatics

<table>
<thead>
<tr>
<th>Semester</th>
<th>Module</th>
<th>ECTS</th>
<th>Assessment</th>
<th>Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Surveying, Geoinformatics or Land Management</td>
<td>20</td>
<td>7-point scale</td>
<td>Internal</td>
</tr>
<tr>
<td></td>
<td>Managing the Use of Land <em>(only in Aalborg)</em></td>
<td>5</td>
<td>Pass/Fail</td>
<td>Internal</td>
</tr>
<tr>
<td></td>
<td>Geospatial Information Technology <em>(only in Copenhagen)</em></td>
<td>5</td>
<td>Pass/Fail</td>
<td>Internal</td>
</tr>
<tr>
<td></td>
<td>Modern Data Acquisition Methods</td>
<td>5</td>
<td>Pass/Fail</td>
<td>Internal</td>
</tr>
</tbody>
</table>

Specialisation in Surveying and Mapping

<table>
<thead>
<tr>
<th>Semester</th>
<th>Module</th>
<th>ECTS</th>
<th>Assessment</th>
<th>Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd</td>
<td>Positioning and Mapping</td>
<td>20</td>
<td>7-point scale</td>
<td>External</td>
</tr>
<tr>
<td></td>
<td>Statistics and Data Fusion</td>
<td>5</td>
<td>Pass/Fail</td>
<td>Internal</td>
</tr>
<tr>
<td></td>
<td>Positioning and Mapping Technologies</td>
<td>5</td>
<td>Pass/Fail</td>
<td>Internal</td>
</tr>
<tr>
<td>3rd</td>
<td>Professional Development</td>
<td>30</td>
<td>7-point scale</td>
<td>Internal</td>
</tr>
<tr>
<td>4th</td>
<td>Master’s Thesis</td>
<td>30/60</td>
<td>7-point scale</td>
<td>External</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>120</td>
<td></td>
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</tr>
</tbody>
</table>

The specialisation is only offered at AAU in Aalborg.

Specialisation in Land Management

<table>
<thead>
<tr>
<th>Semester</th>
<th>Module</th>
<th>ECTS</th>
<th>Assessment</th>
<th>Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd</td>
<td>Spatial Development and Planning</td>
<td>20</td>
<td>7-point scale</td>
<td>External</td>
</tr>
<tr>
<td></td>
<td>Spatial Planning and Governance</td>
<td>5</td>
<td>Pass/Fail</td>
<td>Internal</td>
</tr>
<tr>
<td></td>
<td>Land Use Regulation and Land Economics</td>
<td>5</td>
<td>Pass/Fail</td>
<td>Internal</td>
</tr>
<tr>
<td>3rd</td>
<td>Professional Development</td>
<td>30</td>
<td>7-point scale</td>
<td>Internal</td>
</tr>
<tr>
<td>4th</td>
<td>Master’s Thesis</td>
<td>30/60</td>
<td>7-point scale</td>
<td>External</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>120</td>
<td></td>
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</table>

The specialisation is only offered at AAU in Aalborg.

Specialisation in Geoinformatics

<table>
<thead>
<tr>
<th>Semester</th>
<th>Module</th>
<th>ECTS</th>
<th>Assessment</th>
<th>Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd</td>
<td>GI-Integration, Applications and Society</td>
<td>20</td>
<td>7-point scale</td>
<td>External</td>
</tr>
<tr>
<td></td>
<td>Geocomputation and Spatial Analytics</td>
<td>5</td>
<td>Pass/Fail</td>
<td>Internal</td>
</tr>
<tr>
<td></td>
<td>Geovisualisation</td>
<td>5</td>
<td>Pass/Fail</td>
<td>Internal</td>
</tr>
<tr>
<td>3rd</td>
<td>Professional Development</td>
<td>30</td>
<td>7-point scale</td>
<td>Internal</td>
</tr>
<tr>
<td>4th</td>
<td>Master’s Thesis</td>
<td>30/60</td>
<td>7-point scale</td>
<td>External</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>120</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The specialisation is only offered at AAU in Copenhagen.

Modules are described in section 3.2, 3.3 and 3.4.
3.2 Descriptions of modules. 1st and 2nd Semester.

Title (project): Surveying, Geoinformatics or Land Management

Objective: To give the students the opportunity to work with problems related to Surveying, Geoinformatics or Land Management.

Students who complete the project module must:

Knowledge:
- be knowledgeable about technologies and theories/methods relevant within Surveying, Geoinformatics or Land Management
- be knowledgeable about the fundamental principles of Problem Based Learning (PBL) as implemented in the Aalborg PBL model (*)

Skills
- master theories/methods related to Surveying, Geoinformatics or Land Management.
- be able to evaluate theories/methods related to Surveying, Geoinformatics or Land Management.
- be able to identify problems related to Surveying, Geoinformatics or Land Management.
- be able to assess/analyse problems related to Surveying, Geoinformatics or Land Management.
- be able to suggest solutions to problems related to Surveying, Geoinformatics or Land Management.
- be able to assess the quality of the suggested solutions
- be able to communicate/discuss problems related to Surveying, Geoinformatics or Land Management with both peers and non-specialists
- be able to structure project management activities based on a well formulated problem formulation (*)

Competencies
- be able to master relevant data and technologies
- be able to master general skills required to solve typical tasks
- be able to give advice regarding problems related to Surveying, Geoinformatics or Land Management
- must be able to structure and combine theoretical discussions with practical challengers throughout the project work and its result (the project report)
- be able to reflect on, plan and manage a study project in a PBL learning environment (*)

Type of instruction: Project work.
Exam format: Oral examination based on project report.

Evaluation criteria: Are stated in the Joint Programme Regulations.

(*)
To obtain the knowledge, skills and competence marked with (*) it is presupposed that students follow the course in Problem Based Learning and Project Management that the school offers all foreign students in the beginning of 1st semester.
Title course): Managing the Use of Land (Arealforvaltning)

Objective
The aim of the module is to acquire general knowledge of regulation of land use and land management. Emphasis is placed on different levels of administration, including legal, policy and institutional contexts in relation to managing the use of land. The module also stresses international comparisons of spatial planning land administration systems and sectorial land-use regulations from different European countries and beyond.

Having completed the course module, the students

Knowledge
• must have knowledge and understanding of Land Management and regulation of land use, both in Denmark and abroad
• must acquire knowledge of theories of the state in relation to national, regional and local government, and the changing political landscapes that influence the scope of policy and decision-making at different levels of land administration
• must develop an understanding of the legal and administrative options in relation to planning, administration and regulation of land use

Skills
• must be able to develop analyses of land use situations in light of international comparisons, and to assess particular courses of action in relation to land administration in connection with sectorial land-use regulations
• must be able to critically reflect on land administration decisions at the local level, and to assess such decisions in accordance with theoretical and practical understandings of changing contexts and political settings
• must be able identity core issues – of both a legal, technical, organizational, economic and social nature – in relation to the development real property

Competencies
• must be able to work in developing critical understandings, analyses and assessments of theoretical aspects of land management and regulation of land use.
• must be able to perform comparative international analyses in relation to approaches at different spatial scales.

Type of instruction: Lectures, workshops, seminars, assignments, presentations.

Exam format: Portfolio / student presentations / active participation/ completed through the assignment of an essay.
Evaluation criteria: Are stated in the Joint Programme Regulations.
Title (course): Geospatial Information Technology (Geospatial informationsteknologi)

Objective: Students who complete the module will acquire the following knowledge, skills and competencies:

Knowledge about
• Systems design
• System development for geospatial applications using AGILE methods
• Spatial databases and query languages
• Principles of Distributed GIS
• Standards for web-based GI applications

Skills in
• Understanding the path from user requirements over design to implementation and test.
• Applying up-to-date system development methods and programming tools
• Evaluating the various approaches to systems design and development.

Competencies
• Ability to design and build simple spatially enabled applications using modern object orientated development tools.

Type of instruction: Combined lectures and exercises.

Exam format: Portfolio examination.

Evaluation criteria: Are stated in the Joint Programme Regulations.
Title (course): Modern Data Acquisition Methods (Moderne metoder til tilvejebringelse af geodata)

Objective: Students who complete the module will acquire the following knowledge, skills and competencies:

Knowledge about
- the role of geoinformation in e-Gov
- spatial data infrastructure (SDI), standardisation of geographic information according to ISO, Open Geospatial Consortium, and INSPIRE
- the role of crowd sourcing in data collection (Volunteered Geographic Information (VGI), Citizen Science, and PPGIS)
- available data sources like Copernicus and various geoportals like the Danish Data Distribution portal
- remote sensing using satellites, UAV (unmanned aerial vehicles) and laser scanning systems (aerial and land based)
- modern methods for distributing geospatial information
- handling and storing geospatial information
- the use of modern data acquisition methods for developing applications in smart cities, precision farming, and environmental monitoring

Skills:
- being able to compare and assess different data acquisition technologies.
- being able to understand the principles of handling huge amounts of geographic information (Big Data)
- being able to understand the importance of standardisation and data quality, including the use of metadata
- being able to understand the importance of geographic information in solving societal challenges

Competencies:
- in advising on the selection of appropriate data acquisition methods for specific applications
- in advising on the use of different data handling methods

Type of instruction: Lectures, workshops, seminars, assignments, presentations.

Exam format: Written or oral examination

Evaluation criteria: Are stated in the Joint Programme Regulations.
3.2.1 Specialisation in Surveying and Mapping

Title (project): Positioning and Mapping
(Positionering og kortlægning)

Prerequisites: Having completed the 1st Semester.

Objective: To give the students the opportunity to work with problems related to positioning and mapping. Students who complete the project module must:

Knowledge:
• be knowledgeable about positioning and mapping technologies
• be knowledgeable about theories/methods related to positioning and mapping
• be knowledgeable about theories/methods for assessing the quality of data related to positioning and mapping

Skills:
• master theories/methods related to positioning and mapping.
• be able to evaluate theories/methods related to positioning and mapping
• be able to identify problems related to positioning and mapping
• be able to assess/analyse problems related to positioning and mapping
• be able to suggest solutions to problems related to positioning and mapping
• be able to assess the quality of the suggested solutions
• be able to communicate/discuss problems related to positioning and mapping with both peers and nonspecialists
• be able to give advice regarding problems related to positioning and mapping

Competencies:
• be able to master selected positioning and mapping technologies
• be able to master general skills required to solve typical positioning and mapping tasks

Type of instruction: Project work.

Exam format: Oral examination based on project report.

Evaluation criteria: Are stated in the Joint Programme Regulations.
Title (course): Statistics and Data Fusion
(Statistik og data fusion)

Prerequisites: Having completed the 1st Semester.

Objective: To give the students thorough knowledge of selected statistical methods in surveying and mapping. To give the students thorough knowledge of methods for relating spatial coordinate systems and for defining map projections. To give the students thorough knowledge of selected data fusion methods in surveying and mapping. Students who complete the course module must:

Knowledge:
• be knowledgeable about statistical concepts and achieve an understanding of the statistical way of thinking
• be knowledgeable about theories/methods concerning construction of map projections and conversions between spatial coordinate systems
• be knowledgeable about theories/methods for fusing mapping related data sets

Skills:
• be able to master and evaluate selected statistical methods in relation to surveying and mapping
• be able to master and evaluate the use of spatial coordinate systems and map projections
• be able to master and evaluate relevant theories/methods in relation to data fusion

Competencies:
• be able to master general skills required to solve typical statistical tasks in relation to surveying and mapping
• be able to master general skills required to solve typical tasks in relation to defining and using map projection and spatial coordinate system
• be able to master general skills required to solve typical tasks related to data fusion and mapping

Type of instruction: Combined lectures and exercises.

Exam format: Written or oral examination.

Evaluation criteria: Are stated in the Joint Programme Regulations.
Title (course): Positioning and Mapping Technologies (Positionering og kortlægningsteknologier)

Prerequisites: Having completed the 1st Semester.

Objective: To give the students thorough knowledge of various positioning/mapping methods and technologies. Students who complete the course module must:

Knowledge:
- be knowledgeable about positioning/mapping methods and technologies like GNSS, laser scanning, photogrammetry, remote sensing, and IMU.

Skills:
- be able to master and evaluate positioning/mapping methods and technologies.

Competencies:
- be able to master selected positioning/mapping technologies required to solve typical positioning/mapping tasks.

Type of instruction: Combined lectures and exercises.

Exam format: Written or oral examination.

Evaluation criteria: Are stated in the Joint Programme Regulations.
3.2.2 Specialisation in Land Management

Title (project): Spatial Development and Planning (Spatial udvikling og planlægning)

Objective: The main focus of the project module is on managing and facilitating urban and/or rural spatial development, land use and planning in a societal context and on levels above the individual property. The project must identify and analyse a specific spatial development challenge in an urban or rural context, and must be able to develop this into a specific land use policy or planning challenge. The project analyses relevant political, legal and administrative frameworks and practices, including relevant norms, interests, actors, regulations, organisational settings, procedures and processes related to the chosen challenge. If relevant, aspects of land economics and/or e-governance can also be included. Finally, the project discusses, critically relates to and concludes the implications of the analysis. The project can propose specific changes and solutions to relevant policies, plans and/or settings, procedures and processes. The overall aim of the project is to provide the students with abilities to advice, manage, facilitate and develop land use and spatial policy, planning and management processes.

Having carried out the project module, the students

Knowledge
- must have knowledge and understanding of relevant theories and practices concerning the framework conditions, organisation and processes of spatial development, policy, planning, management and governance – with respect to the chosen challenge.
- must have knowledge of different norms and interests related to the specific activities of spatial policy, planning and governance associated with the chosen challenge, e.g. norms of democracy, participation, efficiency and economic, socio-cultural and environmental sustainability.
- must have knowledge of the integration of e-governance and spatial data infrastructures in spatial policy, planning and land management if this is particularly relevant for the chosen challenge.
- must have knowledge of and be able to critically relate to practical and scientific challenges concerning policy-making, planning, management, facilitation, administration and implementation of spatial development and land use – to the extent that it is relevant for the chosen challenge.

Skills
- must be able to identify and analyse a specific urban and/or rural spatial development challenge, and must be able to relate and
develop this into a specific spatial policy, planning or governance challenge.

- must be able to apply theories and methods of relevance to the chosen challenge. Must be able to argue the design and general methods of the project in relation to scientific methodology.
- must be able to analyse and critically assess relevant interests, actors, legislation, organisational settings, procedures and processes related to the chosen challenge, e.g. in relation to different societal norms, such as sustainability and democracy.
- must be able to identify conflicting or mutually reinforcing aspects.
- must be able to conclude and discuss the theoretical and/or practical implications of the analysis and assessments performed in the project.
- must be able, if relevant, to propose specific changes and solutions to relevant policies, plans and/or organisational settings, procedures and processes related to the chosen challenge.

Competencies

- must be able to advice, manage, facilitate and develop policymaking, planning and administrative settings, procedures and processes concerning spatial development and land use.
- must be able to structure and combine theoretical discussions with practical challenges throughout the project work and its result (the project report).
- must be able to independently initiate and carry out tasks of planning, management and administration in interdisciplinary cooperation, and
- must be able to take on professional responsibility.

Type of instruction: Problem-oriented project work in groups. Workshops, seminars, assignments and/or mini projects that supplements the project work.

Exam format: Oral examination, based in a project report. Potential supplementary activities are evaluated as an integrated part of the project work.

Evaluation criteria: Are stated in the Joint Programme Regulations.
Objective: Having carried out the course module, the students

Knowledge
• must have knowledge and understanding of theories, ideas and norms of spatial planning, management and governance, from rational to postmodern perspectives.
• must have understanding of the role of power, interests, democracy, participation and knowledge in spatial policy, planning and governance.
• must have understanding of the role of cultures, institutions and discourses in spatial policy, planning and governance.
• must have knowledge of theories of territorial policy integration, networking and governance across sectors and levels.

Skills
• must be able to apply theories and models of urban and rural planning, governance and land management in order to facilitate spatial development.
• must be able to analyse and assess spatial policy, planning and governance in relation to sustainability, power and democracy.
• must be able to analyse and assess the practices and roles of different actors and networks in spatial policy, planning and governance, ranging from government-lead top-down activities to stakeholder and bottom-up citizen involvement activities.

Competencies
• must be able to manage spatial policy, planning and governance as a complex and relational technical, political, administrative and socio-cultural process.
• must be able to combine and integrate theoretical discussions with practical challenges, across both disciplines and sectors.
• must be able to advice, manage, facilitate and develop spatial policy, planning and governance settings and processes in cooperation and networks across disciplines, sectors and actors.

Type of instruction: Lectures, workshops, seminars, assignments, presentations.
Exam format: Active participation/portfolio.
Evaluation criteria: Are stated in the Joint Programme Regulations.
Title (course): Land Use Regulation and Land Economics (Arealregulering og økonomi)

Objective: Having carried out the course module, the students

Knowledge
• must have knowledge of the organisation, principles and administration of governing systems, authorities, legislation and legal procedures related to spatial planning and regulation of land use.
• must have knowledge of the conditions, limitations and opportunities as well as the competence of planning and land management authorities.
• must have knowledge of the relationship between public sector planning and regulation and land and property economics, including financing of urban development and housing.
• must have knowledge of challenges and opportunities concerning Public-private partnerships and agreements related to spatial development and planning.

Skills
• must be able to identify and apply theories and models of legislation and administration concerning the development of urban and rural areas.
• must be able to assess the role of the public sector in land economics.
• must be able to identify, analyse and assess challenges and opportunities for public-private interaction in spatial planning, administration and property development, in particular concerning public-private partnerships and agreements.
• must be able to critically analyse and discuss scientific and practical challenges to relations between the public and private sector, planning legislation and administration, as well as between urban development and financing.
• must be able to communicate research based knowledge and discuss problems and challenges concerning the relation between public and private actors in development of urban and rural areas.

Competencies
• must be able to advice and manage complex spatial development situations and produce solution models for specific measures, including planning and regulation of land use, financing of land and the built environment and infrastructures, and public-private interaction.
<table>
<thead>
<tr>
<th>Type of instruction:</th>
<th>Lectures, workshops, seminars, assignments, presentations, miniproject (possibility).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam format:</td>
<td>Active participation/portfolio.</td>
</tr>
<tr>
<td>Evaluation criteria:</td>
<td>Are stated in the Joint Programme Regulations.</td>
</tr>
</tbody>
</table>
3.2.3 Specialisation in Geoinformatics

Title (project): GI – Integration, Applications and Society (GI – Integration, anvendelser og samfundet)

Prerequisites: Having completed the 1st Semester.

Objective: To give students the opportunity to work with self-chosen problems related to the role of GI in decision-making through applying geocomputation techniques, geovisualisation, image processing and decision support technology.

Skills in
- The use of different spatial analysis and geocomputational techniques and understanding their strengths and weaknesses in decision-making processes
- Communicating their data and findings through geovisualisation tools in all steps of decision-making
- Evaluating the performance of various types of spatial decision support systems

Competencies in
- Designing and setting up advanced systems for knowledge based e-government in smaller organisations

Type of instruction: Self-chosen projects with supervision.

Exam format: Oral examination based on the project report.

Evaluation criteria: Are stated in the Joint Programme Regulations.
Title (course): Geocomputation and Spatial Analytics (Geografisk analyse og modellering)

Prerequisites: Having completed the 1st Semester.

Objective: Students who complete the module will acquire the following knowledge, skills and competencies:

Knowledge about
- A wide range of advanced analysis and modelling methods like spatial statistics, raster-based modelling, network analysis, predictive models, multivariate analysis, classification, and hydrological analysis,
- Multi-criteria evaluation and decision support systems.

Skills in
- Being able to understand and identify the strengths and weaknesses of the different geoprocessing methods and tools.
- Identifying and applying advanced geocomputational techniques and decision analysis to solve practical problems

Competencies in
- Having the ability to design and develop decision support systems from identifying appropriate data and tools to present the results to the decision makers and the public

Type of instruction: Combined lectures and exercises.

Exam format: Portfolio examination.

Evaluation criteria: Are stated in the Joint Programme Regulations.
Title (course): Geovisualisation (Geovisualisering)

Prerequisites: Having completed the 1st Semester.

Objective: Students who complete the module will acquire the following knowledge, skills and competencies:

Knowledge about
• The use of geovisualisation as a way of communication
• Interpolation and geostatistical methods as a means of analysing point pattern observations
• The principles for web-based geovisualisation
• Multi-spectral image interpretation
• Methods and standards for visualisation in space and time

Skills in
• Being able to design simple web-based geovisualisation solutions
• Evaluating different geovisualisation methods from a user’s viewpoint
• Acquiring and processing multi-spectral satellite images and interpretation techniques
• Being able to use tools and standards for developing simple 3D visualisations

Competencies in
• Carrying out advisory tasks concerning appropriate geovisualisation solutions
• Designing and setting up advanced geovisualisation systems

Type of instruction: Combined lectures and exercises.

Exam format: Written examination.

Evaluation criteria: Are stated in the Joint Programme Regulations.
3.3 Description of modules. 3rd Semester

Title: Professional Development
(Faglig og professionel udvikling)

Prerequisites: Students must have completed the 1st Semester (and have followed courses and exams at the 2nd Semester).

At the 3rd semester the student can choose between more options:

**Option 1: Project semester – with or without an integrated project-oriented stay in a company (Internship)**

The student may choose to carry through a traditional project semester which will normally develop the professional competence that the student has acquired within the 1st-2nd semester and/or prepare for the subject about which the student wants to write his/her thesis. The semester comprises preparation of a project report or a scientific article – possibly with the supervisor as the last author of the article.

The student may choose to integrate a project-oriented stay in a company either in Denmark or abroad in the project semester. The project-oriented stay must be of maximum 2-4 months’ duration and must be approved in advance by the Study Board of the Programme in Surveying, Planning and Land Management. For each individual project-oriented stay specific learning goals have to be drawn up, clearly reflecting the professional problem of the project.

Objective: Students completing the project module acquire the following:

Knowledge:
- Must within a selected part of his/her professional field of specialisation have knowledge that bases on the highest international research.
- Must be able to understand and relate critically to the knowledge of the professional field and be able to identify either scientific or practical problems in a given complex context.

Skills:
- Must be able to master the scientific methods and tools of the professional field and to master general skills connected with the solution of the chosen problem.
- Must be able to assess and choose among the scientific methods, tools and general skills and prepare new analysis and solution models.
- Must be able to discuss professional and scientific problems with both colleagues and non-specialists.

Competencies:
- Must be able to control work and development situations that are complex, unpredictable and to imply new solution models.
- Must be able to start and carry through professional and inter-professional cooperation independently and to take a professional responsibility.
• Must be able to independently take the responsibility for own professional development and specialization.

Type of instruction: Project work, possibly with an internship integrated into the project course.

Exam format: Internal oral examination based on the project report or article.

Evaluation criteria: Are stated in the Joint Programme Regulations.

Option 2: 1st semester of another specialisation
A student who has followed the 1st and 2nd semester under one specialisation may alternatively choose to follow the 1st semester of another specialisation on the Programme of Surveying, Planning and Land Management. In that case the student follows course and project modules at this semester in full and will in this way acquire the knowledge, skills and competences, etc. indicated in the curriculum of the 1st semester of the specialisation in question.

Option 3: International or national credit
After preceding approval by the Study Board the 3rd semester can be carried through at another educational institution in Denmark or abroad. Preceding approval (pre-credit) may be expected if studies at another educational institution will impart knowledge, skills and competences which correspond to the knowledge, skills and competences that could otherwise be obtained by following “Project semester – with or without an integrated project-oriented stay in a company (Internship)”, see above.

Option 4: Long final project (thesis)
Students may choose to complete the 3rd and 4th semesters as one long thesis (60 ECTS). Long final project is especially recommended to work with project topics, where an extraordinarily large collection of data is necessary. Final projects must be approved in advance by the Study Board, and the student must fulfil knowledge, skills and competences as indicated for Master’s theses.
3.4 Description of modules 4th Semester:

Title: Master’s Thesis (Kandidatspeciale)

The master thesis can be conducted as a long master thesis using both the 3rd and 4th Semester. If choosing to do a long master thesis, it has to include experimental work and has to be approved by the study board. The amount of experimental work must reflect the allotted ECTS.

Prerequisites: Students must have passed the first three semesters of the education.

Objective: Students completing the module acquire the following:

Knowledge
- Has thorough knowledge of relevant theories and methods in relation to the chosen problem and can reflect on them.
- Is able to describe the used theory or theories so that the special characteristics of this theory are brought to light and in this way document understanding of it or the potentials and limitations of the used theory within the problem field concerned.
- Has knowledge of the scientific-theoretical and methodical roots of the used theories and can reflect on them.
- Has thorough knowledge of the research roots of the chosen problem including knowledge of the most important national and international research in the field.

Skills
- Is independently able to plan and complete a project progress at a high professional level.
- Is able to account for possible methods for solving the problem of the project and describe and assess the suitability of the chosen methods and also account for chosen limitations and their significance to the results of the product.
- Is able to account for the relevance of the chosen problem to the education, including a precise account of the core of the problem and the professional context in which it appears.
- Is able to analyse and describe the chosen problem by using relevant theories and empirical investigations.
- Is able to analyse and assess the results of empirical investigations, whether it is a question of the students’ own investigations or those of others, including an assessment of the importance of the investigation method to the validity of the results.
- Is able to point at relevant forward-directed strategies, possibilities of change and/or solution proposals.
- Is able to communicate knowledge of the problem to both professionals and non-professionals.

Competencies
• Is able to form a synthesis between the professional problem, theoretical and empirical investigations and to make a critical assessment of the formed synthesis and the other results of the project work.
• Is able to independently participate in interdisciplinary discussions and develop work based on the acquired knowledge of the problem.
• Is able to independently acquire the newest knowledge within the field and on this basis currently improve the professional skills and competences.

Type of instruction: Problem-oriented project work in groups.
Exam format: External oral examination based on the project report of the group.
Evaluation criteria: Are stated in the Joint Programme Regulations.
Chapter 4: Entry into Force, Interim Provisions and Revision

The curriculum is approved by the Dean of The Technical Faculty of IT and Design, and enters into force as of 1\textsuperscript{st} of September 2017 (only 1\textsuperscript{st} semester).

Students who wish to complete their studies under the previous curriculum from 2015 must conclude their education by the summer examination period 2018 at the latest, since examinations under the previous curriculum are not offered after this time.

Chapter 5: Other Provisions

5.1 Rules concerning written work, including the Master’s thesis

In the assessment of all written work, regardless of the language it is written in, weight is also given to the student’s spelling and formulation ability, in addition to the academic content. Orthographic and grammatical correctness as well as stylistic proficiency are taken as a basis for the evaluation of language performance. Language performance must always be included as an independent dimension of the total evaluation. However, no examination can be assessed as ‘Pass’ on the basis of good language performance alone; similarly, an examination normally cannot be assessed as ‘Fail’ on the basis of poor language performance alone. The Board of Studies can grant exemption from this in special cases (e.g., dyslexia or a native language other than Danish).

The Master’s thesis must include an English summary.\textsuperscript{1} If the project is written in English, the summary must be in Danish.\textsuperscript{2} The summary must be at least 1 page and not more than 2 pages. The summary is included in the evaluation of the project as a whole.

5.2 Rules concerning credit transfer (\textit{merit}), including the possibility for choice of modules that are part of another programme at a university in Denmark or abroad

In the individual case, the Board of Studies can approve successfully completed (passed) programme elements from other Master’s programmes in lieu of programme elements in this programme (credit transfer). The Board of Studies can also approve successfully completed (passed) programme elements from another Danish programme or a programme outside of Denmark at the same level in lieu of programme elements within this curriculum. Decisions on credit transfer are made by the Board of Studies based on an academic assessment. See the Joint Programme Regulations for the rules on credit transfer.

5.3 Rules for examinations

The rules for examinations are stated in the Examination Policies and Procedures published by The Technical Faculty of IT and Design, The Faculty of Engineering and Science, and the Faculty of Medicine on their website.

\footnote{1 Or another foreign language (upon approval from the Board of Studies.)}
\footnote{2 The Board of Studies can grant exemption from this.}
5.4 Exemption
In exceptional circumstances, the Board of Studies study can grant exemption from those parts of
the curriculum that are not stipulated by law or ministerial order. Exemption regarding an
examination applies to the immediate examination.

5.5 Rules and requirements for the reading of texts
At programmes taught in Danish, it is assumed that the student can read academic texts in modern
Danish, Norwegian, Swedish and English and use reference works, etc., in other European
languages. At programmes taught in English, it is assumed that the student can read academic
text and use reference works, etc., in English.

5.6 Additional information
The current version of the curriculum is published on the Board of Studies’ website, including more
detailed information about the programme, including exams.