MASTER’S PROGRAMME IN SOCIAL DATA SCIENCE

Programme curriculum

2020 curriculum, commencement on 1 February 2021
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1. Introduction

This programme curriculum should be read in conjunction with the Curricula's Common Part for the Faculty of Social Sciences, which applies to all bachelor’s and master’s degree programmes run by the faculty. The Curricula’s Common Part lays out rules that apply to all of the faculty’s programmes.

The programme curriculum was approved by the dean of the Faculty of Social Sciences on 7 July 2020 and is valid from 1 September 2020. This latest revision is approved in October 2020 and it takes effect on February 1 2021.

2. Title and affiliation

Graduates who have completed the master's degree programme in social data science are entitled to use the title of Master of Science (MSc) in Social Sciences in Social Data Science. The corresponding title in Danish is cand.soc. i social datavidenskab.

The MSc in Social Data Science is an interdisciplinary programme based across departments at the faculty of Social Sciences at the University of Copenhagen. The Social Data Science programme has a board of studies. The administrative affiliation is with the Faculty of Social Sciences. The Board of Examiners is that of the Department of Sociology.

3. The programme’s objectives, competency profile etc.

3.1 Objectives

The University Programme Order stipulates that:

- The purpose of the master's programmes in the social science area is to qualify the student to identify and analyse complex social phenomena and to apply theoretical and methodological knowledge and skills within a wide range of professions in the public and private sectors.
- The master's programmes include one or more social science subjects or other subjects relevant to the work of a social science graduate.
In addition to the above points, MSc in Social Data Science programme has the following specific purposes:

1. Providing students with the opportunity to improve their skills and specialise in both the social science aspects and data science aspects of social data science, as well as working with other social science disciplines.

2. Providing students with further academic knowledge, theoretical qualifications and methodological competencies to enable them to independently identify, formulate and solve advanced complex issues within the social science aspects of social data science.

3. Providing students with the basis for undertaking relevant job functions and qualifying them for enrolment in a PhD programme in social data science or in one of the core social sciences.

3.2 Competence profile

During the programme, students will acquire the knowledge, skills and competencies listed below to both work and conduct research in the field of social data science. Students will also acquire additional individual qualifications through elective courses as well as field and project work, and through writing an MSc thesis.

Graduates have the following qualification profile on successful completion of the programme:

Knowledge

- List and explain different uses of social science methods and concepts relevant to social data science.
- Account for and reflect on the ethical, legal, and political framework for and consequences of how a given dataset was obtained and applied to analysis.
- Explain fundamental properties of individual and social behaviour, networks, and ideas based on a reflective application of quantitative and qualitative methods as well as models and theories from multiple disciplines in social science.
- Account for the new possibilities that digital and other big and social data types afford for research of contemporary problems in business and in society.
- Explain how quasi-experimental methods can be used to establish causality and measure the effect sizes of policies.

Skills

- Analyse, qualify and independently apply big and complex data in, among other things, value-generating activities in business, public administration, and civil society.
- Master state-of-the-art programming language for collection, processing, preparation, and analysis of data.
- Employ state of the art data science tools, including methods from supervised and unsupervised machine learning, web scraping, network analysis, visualization, special analysis, natural language processing etc. to the analysis of societal and organizational problems.
- Combine quantitative and qualitative empirical methods from social science, including statistical analysis, ethnographic methods, digital methods, and experimental methods with data science tools in order to analyse complex societal and organizational problems.
- Identify the societal potential of and challenges to working with ‘big data’.
- Assess and present arguments for and against the quality of own as well as others’ application of statistical methods, datasets, and analytical approaches, including assessing the ethical, legal, political, and societal consequences of the produced knowledge.
- Communicate research-based knowledge from own and others’ research in writing, visualization, and speech, and discuss societal and scientific problems with fellow social data scientists and non-experts alike.

**Competencies**

- Independently plan, lead and complete a social data science study/examination/research aimed at obtaining new knowledge to help overcome challenges in business or society. This entails designing, executing and analysing complex and big data projects with multiple data types concerning behaviour, networks, and ideas. The data types include but are not limited to data on individuals and social relations from surveys, registries, experiments as well as online platforms and ethnographic studies and may come in the form of text and image data, temporal and spatial.
- Manage the legal and ethical aspects of collecting and processing personal data as well as making decisions based on the data. This includes fulfilling personal data requirements of the EU, handling secondary use of data and questions of reproducibility and validity of implementing data governance in organisations.
- Assess and evaluate the possibilities and limitations of data in a specific research-related and organisational context.
- Convey central concepts from one scientific discipline to others.
- Lead and coordinate cooperation in interdisciplinary teams with people from other scientific fields and traditions in the application of social data science in order to create value in businesses and in society.
- Independently identify and take responsibility for further personal scientific development and specialisation in the private and public sectors alike.
3.3 Admission requirements and restrictions

In order to be admitted into the MSc in Social Data Science, applicants must meet the following requirements:

- Hold one of the following bachelor’s degrees from a Danish university, or a bachelor’s degree equivalent to any of the fields below from a recognised Danish or international university.

  - Agricultural economics
  - Anthropology
  - Business administration and digital management
  - Business administration and project management
  - Business administration and psychology
  - Business administration and sociology
  - Data Science
  - Digital design and interactive technologies
  - Economics
  - Economic and business administration
  - Education Science
  - European business
  - European ethology
  - Global business informatics
  - International business and politics
  - Mathematic-economics
  - Organisational learning
  - Political science
  - Psychology
  - Public administration
  - Public health
  - Social science
  - Sociology
  - Sociology and cultural analysis
  - Techno-anthropology

- Or hold a bachelor’s degree from a recognised Danish or international university with at least 30 ECTS credits from social sciences courses of which at least one should be a practical methods course. Social sciences courses include, among other things, social statistics courses, ethnography courses and other courses on qualitative or quantitative data collection and analysis; courses on culture, organisation, leadership, innovation, management or related topics which involve empirical data collection, processing or analysis; and bachelor and other self-defined projects which include social data collection, processing or analysis.

- English language proficiency on par with English at Danish B-level with a weighted grade point average of at least 3.0 not rounding up. The requirement may also be met by English on par with Danish A-level with a weighted grade point average of at least 2.0 not rounding up. Go to www.studies.ku.dk to find out how the faculty assesses foreign upper secondary school leaving certificates.
3.4 Prioritisation of applicants

There is a restricted intake of students. If more applicants than the maximum intake meet the admission requirements, a selection will be made on the basis of a comprehensive evaluation, with emphasis on the following criteria:

- Portfolio of bachelor courses relevant for the MSc in Social Data Science
  - In addition to social science courses, this includes other courses with substantial coverage of data science, programming, statistics and/or quantitative methods.
- Relevant experience with quantitative methods and data handling obtained in the course of your bachelor’s studies.
- Grades achieved on bachelor courses relevant for the MSc in Social Data Science
- Statement of purpose for wanting to study Social Data Science (maximum one page) covering:
  a. Your motivation for applying.
  b. How your academic background (courses), skills and competences qualify you for admission to the programme.
  c. Which skills and competences you hope to achieve on the programme.
  d. How you intend to apply these in your thesis and future work

Priority is given to candidates who have obtained their bachelor’s degree within the last five years.

The maximum intake number can be found on the website:

https://studies.ku.dk/masters/social-data-science/application-procedure/

3.4.1 Supplementary courses

Only the applicant’s bachelor’s degree will be considered when the applicant’s academic qualifications are assessed. This means that it is not possible to complete supplementary courses in order to meet the specific admission requirements.

The only exception to this is courses which have been completed before the bachelor’s degree was finished. These courses can either be part of a previous study programme or have been taken as single courses. However no more than 30 ECTS credits from such courses can be considered in the assessment.
4. Content and academic profile

The core subject area in the master's degree programme is social data science. The table below is an overview of the allocation of subject elements to the master's degree programme. It is recommended that the courses are followed in the outlined order. Students must follow Advanced Social Data Science II (ASDSII) concurrently with the Digital Methods course.

<table>
<thead>
<tr>
<th>The master’s programme in Social Data Science (120 ECTS)</th>
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<tbody>
<tr>
<td><strong>Block 1</strong></td>
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<tr>
<td>Semester 1 (Autumn, year 1)</td>
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<tr>
<td>Social Data Science Base Camp (15 ECTS)</td>
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<tr>
<td>Data Governance: Law, Ethics, and Politics (7.5 ECTS)</td>
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<tr>
<td><strong>Block 3</strong></td>
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<tr>
<td>Semester 2 (Spring, year 1)</td>
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<tr>
<td>Advanced Social Data Science I (7.5 ECTS)</td>
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<tr>
<td>Advanced Social Data Science II (7.5 ECTS)</td>
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<tr>
<td>Semester 3 (Autumn, year 2)</td>
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<tr>
<td>Semester 4 (Spring, year 2)</td>
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4.1 Compulsory courses

The programme consists of the following constituent and compulsory courses worth a total of 90 ECTS credits:

- Social Data Science Base Camp (15 ECTS)
- Elementary Social Data Science (7.5 ECTS)
- Data Governance: Law, Ethics, and Politics (7.5 ECTS)
- Advanced Social Data Science I (7.5 ECTS)
- Social Data Analysis (7.5 ECTS)
- Advanced Social Data Science II (7.5 ECTS)
- Digital Methods (7.5 ECTS)
- Master’s Thesis (30 ECTS)
The recommended order of the courses' position on the programme is stated above. The courses may be taken in any order, provided that the continuous academic progress and the maximum completion time are complied with, in accordance with the Curricula's Common Part for the Faculty of Social Sciences. Students are recommended to follow 30 ECTS credits per semester. Students must place the master’s thesis on their final semester of the programme.

4.2 Elective courses and mobility window
Students have a free choice of 30 ECTS elective master’s courses. Students may follow courses outside of the faculty and the university. If electives courses are taken at a Danish educational institution at least 5 ECTS must be graded in accordance with the Danish 7-point grading scale.

4.2.1 Elective courses offered by the programme
The programme also offers its own three elective courses that students may choose to follow separately or in combination (read more in section 6.8):
- Data Collection, Processing and Analysis (7.5, 15 or 22.5 ECTS)
- Extra-curricular Written Assignment (7.5 ECTS)
- Academic internship (15 or 30 ECTS)

4.3 Registration for courses and exams
The study administration will register students for courses and exams on the first semester (block 1+2) of the master’s programme. For the rest of the programme, students register themselves for courses and exams via self-service on KUnet during the announced self-service period prior to each semester.

4.4 Credit
Students on the master’s degree programme in Social Data Science are entitled to transfer a maximum of 30 ECTS credits from subjects studied at another educational institution in Denmark or abroad. Exempt from this rule are students who transfer credits for course elements when transferring from another institution or study programme and credits from programmes already
successfully completed. Read more about the rules and procedures for approval and transfer of credit in section 5.5 of the Curricula’s Common Part.

5. Exam
All written assignments for exam must adhere to the general rules on examination, please see the Curricula’s Common Part section 4. Furthermore, all exams must adhere to the following rules:

- For courses prescribed to 7.5 ECTS credits, the written assignment must be no longer than 20 pages for a group of 3 students, no more than 25 pages for a group of 4 students, and no more than 10 pages for individually written assignments. The maximum length of written assignments for courses prescribed to a different number of ECTS credits than 7.5 is adjusted proportionally to the number of credits. This does not include the master’s thesis.
- All written group exams must be written and submitted in groups of at least 3 students and no more than 4 students.

5.1 Assessment and grading
The assessment of exams complies with the grading requirements in the Curricula’s Common Part and The Examination Order (Eksamensbekendtgørelsen).

The following compulsory course, amounting to a total of 15 ECTS credits, will be assessed through a pass/fail examination:
- Social Data Science Base Camp (15 ECTS)

The following compulsory courses, amounting to a total of 75 ECTS credits, will be assessed in accordance with the Danish 7-point grading scale:
- Elementary Social Data Science (7.5 ECTS)
- Data Governance: Law, Ethics and Politics (7.5 ECTS)
- Advanced Social Data Science I (7.5 ECTS)
- Social Data Analysis (7.5 ECTS)
- Advanced Social Data Science II (7.5 ECTS)
- Digital Methods (7.5 ECTS)
- Master’s Thesis (30 ECTS)

The following compulsory courses, amounting to a total of 45 ECTS credits, will be assessed by one external examiner:
- Elementary Social Data Science (7.5 ECTS)
• Social Data Analysis (7.5 ECTS)
• Master’s Thesis (30 ECTS)

5.1.1 Amount of elective ECTS's graded in accordance with the Danish 7-point grading scale
One elective course (at least 5 ECTS) must be graded in accordance with the Danish 7-point grading scale. For the entire programme at least 80 ECTS credits must be assessed in accordance with the Danish 7-point grading scale.

Exemption:
Courses taken abroad are exempt from this rule. If 30 ECTS credits are taken abroad at least 75 ECTS credits must be assessed in accordance with the Danish 7-point grading scale for the entire program.

6. Course catalogue
The range of courses offered on the master’s degree programme in Social Data Science is outlined below. Subjects and exams are quantified according to the European Credit Transfer System (ECTS), under which system 60 ECTS credits correspond to one year of full-time study. If a subject is weighted at 7.5 ECTS credits, this will correspond to 1/8 of one year’s prescribed full-time study.

Note: In all compulsory courses, the exam form is group exam in groups of 3-4 students.

6.1 Social Data Science Base Camp
Extent
The course amounts to 15 ECTS credits.

Course description
This three-part course introduces students to the interdisciplinary degree program of social data science. In the first two weeks, students are introduced to the group-based learning and working practices, which is a core element of the program. During this period, the students will conduct fieldwork-based ethnographic exercises and will be introduced to other qualitative methods and
analytics. For the remaining five weeks of the course, students are introduced to the fundamentals of programming and data analysis in Python, covering topics such as variables, data structures, functions, and the social context of programming. In parallel, one day a week will feature lectures and exercises that will focus on elementary qualitative, quantitative, and integrated quali-quant methods. Throughout all seven weeks, a lecture series with speakers from within and outside the academy shall present examples and cases spanning the breadth and potentials of the novel field of social data science.

**Learning outcome**

At the end of the course, the students are able to:

**Knowledge**

- Define basic concepts within programming, statistics, and underlying mathematics, as well as qualitative and quali-quant methods.
- Account for central themes and research questions within the field of social data science.
- Gauge the landscape of applications and tools for data science and their respective purposes.
- Account for the history and social implications of social data science methods.

**Skills**

- Perform elementary programming tasks, including designing a program to collect data from an API.
- Flexibly structure, merge, and reformat data coming from various sources and in different forms, including both quantitative and qualitative.
- Conduct exploratory data analysis using descriptive statistics and visualization methods.
- Reflect on the combination of ethnography with other social data science methods.

**Competencies**

- Evaluate and apply data science programming.
- Work with and analyse data in interdisciplinary teams.
- Communicate social data science insights using basic data visualization and appropriate statistical methods.
- Identify and design potential solutions to common problems arising from new data sources, such as text and other unstructured data types.

**Teaching and working methods**

Lectures, seminars, group work, exercises, coding tutorials and methods workshops.
Exam form
Individual written exam (portfolio). A series of short assignments will be administered throughout the course posing one or more sets of questions, with feedback provided during the course. All of the assignments must be submitted in revised and compiled form for assessment at the end of the course. All in all, the portfolio exam must be no longer than 20 standard pages.

Re-examination: The second and third exam attempts run identical to the ordinary examination.

Assessment
The exam is pass/fail.
The exam is assessed by an internal examiner.

6.2 Elementary Social Data Science

Extent
The course amounts to 7.5 ECTS credits.

Course description
This course provides students with a comprehensive introduction to the central concepts and research processes that inform the field of social data science. The course introduces and offers basic experience with important research methods of social data science, covering classic approaches such as experiments and surveys, new approaches such as “big data” analysis and machine learning, as well as their intersection. The course structure follows an ideal form of the research process with three interconnected blocks. The first block reviews the research design stage, including generating research questions and hypotheses as well as evaluating different research approaches. The second block surveys prominent tools for data collection. The third block provides an overview of the methods available to analyse quantitative data, centering regression analysis. In all, the course prepares students to conduct basic social data science research and to acquire advanced methods in later courses.

Learning outcome
At the end of the course, the students are able to:
Knowledge

- Explain the principles of empirical social science informing both quantitative and qualitative research.
- Account for a broad variety of data collection methods used in the social sciences, as well as their strengths and weaknesses.
- Account for the fundamental data analysis methods in social data science, as well as their strengths and weaknesses.
- Explain common criteria for high-quality, replicable social science research.

Skills

- Read, interpret, and produce pre-registrations of social science research.
- Collect primary data to answer research questions using survey and experimental methods.
- Collect secondary data to answer research questions from online sources using web scraping, online archives, and APIs.
- Develop social science research designs including generating research questions, operationalizing theoretical concepts, and following best practices.
- Conduct basic qualitative and quantitative data analysis, particularly basic regression analyses.

Competencies

- Evaluate and critically reflect on published social science research by applying the highest international standards.
- Identify opportunities to use digital data sources and apply computational methods to generate novel social scientific insights.
- Plan and conduct high-quality social data science research projects, encompassing the research design, data collection, and data analysis stages.

Teaching and working methods

Lectures, seminars, group-work and exercises.

Exam form

Portfolio exam written by groups of 3 or 4 students. During the course, students will submit a set of short compulsory assignments, corresponding to the three blocks: Research design, data collection and data analysis, and will receive feedback from the instructors. For the final exam, the three assignments must be submitted in revised and compiled form for assessment at the end of the course.

Re-examination: The second and third exam attempts run identical to the ordinary examination. It will be possible to do the re-examination individually or in groups.
Assessment
The exam is assessed in accordance with the Danish 7-point grading scale.
The exam is assessed by an external examiner.

6.3 Data Governance: Law, Ethics and Politics

Extent
The course amounts to 7.5 ECTS credits.

Course description
From the ethics of individual privacy to legal frameworks such as GDPR and legislation regulating tech giants, new data governance issues surface rapidly in the age of social big data. This course introduces students to key legislation, as well as political and ethical debates concerning the governance and security of data in public and private domains. Students are also taught how to collect, process and store data in compliance with ethical codes and legal frameworks. The course provides students with the necessary knowledge and skills regarding data protection and data management, complementing the social data science and programming skills they acquire in the other courses on the master’s programme.

Learning outcome
At the end of the course, the students are able to:

Knowledge
- Account for ethical, legal and political aspects and consequences of the collection and use of social big data for a given administrative or commercial purpose.
- Understand key legal and social science concepts, ideas, and debates pertaining to the use of social big data in private (profit and non-profit) and public contexts.
- Show familiarity with the content and implications of national and EU legal frameworks for data collection, usage and storage (i.e. GDPR).
Skills

- Explain and evaluate the quality of own as well as others' use of methods, datasets and analytical approaches in relation to the ethical, legal and political consequences of data governance.
- Communicate central questions around data ethics – academic as well as policy-oriented – to peers and non-experts.
- Identify legal, ethical and political issues regarding a concrete data governance problem in an organizational context.
- Identify and analyse key analytical steps and organizational procedures in data governance and management, from problem to solution.

Competencies

- Comply with and navigate existing key legislation, rules, and ethical frameworks for personal data management and governance, including GDPR.
- Critically assess possibilities and risks associated with uses of data in implementing data governance policies and rules in organizations and institutions based on frameworks from social science and law.
- Navigate concrete cases of data governance, including identification of problems, risk assessment, final proposal and pilot check of new governance schemes.
- Design efficient, ethically and legally sound procedures for managing data, including data stewardship, ownership, compliance, privacy, data risks, data sensitivity and data sharing.

Teaching and working methods

The course combines lectures, workshops, quizzes, group exercises, student presentations and peer-feedback seminars. There will be guest lectures by experts, especially with respect to teaching related to GDPR and Danish data protection legislation.

Exam form

The exam consists of two separate written essays that students write in groups.

The first essay is a free assignment with an independently formulated problem. The essay must include an analysis of the legal, ethical and political issues pertaining to a real-world case study related to the application, management and governance of data. Students are expected to draw on arguments and theories from the course literature. The essay should have a clear problem statement and a number of sections analysing the case study from legal, ethical and political perspectives.

The second essay is a three-day take-home assignment. The essay must include an account of how to make a dataset legally compliant and ethically justifiable. Students are supplied with a dataset
that resembles the types of datasets they will be working on in other courses on the master’s programme.

The total length of the two essays must not exceed the general length prescriptions for written exams, cf. section 5. The number of pages should be approximately equally distributed between the two essays.

Re-examination: The second and third exam attempts will be different from the ordinary examination in two regards: 1) for the first essay, students should answer a substantially new problem statement of their own choosing; 2) for the second essay, the dataset will be different from the ordinary examination. It will be possible to do the re-examination individually or in groups.

**Assessment**

The exam is assessed in accordance with the Danish 7-point grading scale. The two essays are given equal weight for the final grade given.

The exam is assessed by an internal examiner.

### 6.4 Advanced Social Data Science I

**Extent**

The course amounts to 7.5 ECTS credits.

**Course description**

The course introduces students to advanced quantitative social science methods, supervised machine learning and formal models of networks. The social sciences have developed a number of methods and approaches to inferring causal relations and testing theory based on observational data and ‘found’ data. At the same time, machine learning methods are becoming ever more prominent, both for measurement and analysis. The first part of the course introduces advanced regression models and key research designs for causal identification from observational data in the social science, including regression-discontinuity, difference-in-difference, event studies and instrumental variables. The second part of the course introduces the basic approaches to and methods of supervised machine learning in a social science context. This includes linear models, tree-based classification and (cross)validation.
We also introduce the intersection of machine learning and social science empirical methods and to challenges in (re)interpreting machine learning results through a social science lens, with a focus on machine learning model explainability and interpretability. Finally, the course introduces basic network concepts and measures to be explored further in the Social Data Theory.

**Learning outcome**

At the end of the course, the students are able to:

**Knowledge**

- Show familiarity with advanced regression methods and different research designs for causal inference in the social sciences.
- Describe core concepts and methods in supervised machine learning, including linear models, tree-based classification, overfitting, bias/variance trade-off and cross-validation.
- Provide an overview of empirical issues at the intersection between machine learning and social science and describe challenges of interpretability of machine learning models.
- Define key concepts in the analysis of complex networks.

**Skills**

- Implement common social science identification strategies to handle problems of endogeneity and selection.
- Set up and execute simple supervised machine learning models for measurement and prediction in Python.
- Explain challenges in applying and learning from machine learning in a social science context.
- Structure network data in Python, as well as to construct and extract various network measures.

**Competencies**

- Design and carry out basic analyses of complex social science networks.
- Evaluate and implement appropriate modelling approaches given dataset and objective, i.e. whether the goal is to evaluate a policy, make a model with best fit of the data or construct new measures.
- Critically assess how various research designs and identification strategies can or cannot be applied to questions of causal relationships in observational and ‘found’ data and use this to develop data collection strategies.
- Account for the possibilities and limitations in the use of machine learning in the social sciences and reflect upon contemporary (mis)use of applications of machine learning in policy and research contexts.


**Teaching and working methods**
Teaching combines lectures and classes, with a heavy emphasis on hands-on work with data in Python. Classes will present students with opportunities to apply their knowledge of programming and data handling and structuring as taught in Social Data Science Base Camp and Elementary Social Data Science to more advanced concepts and problems.

**Prerequisites**
To be eligible for the exam in Advanced Social Data Science I, it is a requirement that students have completed a number of compulsory problem sets based on a social science question combining knowledge of social science research design with methods from the course. The problem sets must be completed in groups and must be approved by the instructor.

**Exam form**
Written exam in the form of a group project.
Re-examination: If there are only a few students for re-examination, the form of the exam will be an extended synopsis with oral defence.

**Assessment**
The exam is assessed in accordance with the Danish 7-point grading scale.
The exam is assessed by an internal examiner.

**6.5 Social Data Analysis**

**Extent**
The course amounts to 7.5 ECTS credits.

**Course description**
This course introduces paradigmatic social scientific theories, models, and analyses of human behaviour (e.g. dual process framework, rational choice theory, theory of planned behaviour), social networks (e.g. tie formation, network structure and position, diffusion), and cultural ideas (e.g. discourse analysis, cultural epidemiology and structuralist analysis).
Through a combination of lectures, seminars and exercises, it is discussed and demonstrated how classic social science problems and theories can be solved and advanced by using data science methods, and how the study of large-scale social data can benefit from social science thinking. As such, the purpose of the course is to provide an overview of central concepts and debates within social data science research, which can serve as a general analytical backdrop for the other more technically or topically specialized courses in the degree program.

**Learning outcome**
At the end of the course, the students are able to:

**Knowledge**
- Account for key social science theories of behaviour, networks and ideas.
- Explain how social data science can be used to inform, test, and develop classic social science theories.

**Skills**
- Assess the relevance of social data science to advance social science theories.
- Evaluate pros and cons of different social data science approaches to analyse social science issues.

**Competencies**
- Pose and formulate a relevant social data science research question.
- Develop a state-of-the-art social data science research design.

**Teaching and working methods**
Teaching combines lectures on historical backgrounds and state-of-the-art material, including primary readings, with seminars, including student presentations, group discussions and Q & A and experience-based learning (e.g. in situ or online experiments with students and other exercises). The seminars will primarily focus on secondary readings.

**Prerequisites**
To be eligible for the exam in Social Data Analysis, it is a requirement that students have passed three individual sit-in or online tests, which access their knowledge and skills with respect to theories, models and analyses of human behaviour, social networks and cultural ideas respectively.

**Exam form**

Written assignment that students write in groups of 3-4 students. The written assignment takes the form of a research design for a potential social data science study with a feasible scope.

Re-examination: The second and third exam attempts run identical to the ordinary exam.

**Assessment**

The exam is assessed in accordance with the Danish 7-point grading scale.

The exam is assessed by an external examiner.

**6.6 Advanced Social Data Science II**

Students must follow Advanced Social Data Science II (ASDSII) concurrently with the Digital Methods course.

**Extent**

The course amounts to 7.5 ECTS credits.

**Course description**

The wealth of new data in the digital society is characterized by high frequency observations in a high granularity setting, allowing for both comprehensive and detailed analysis of social and individual behaviour. Messages in digital form and comments and conversations on social media have the potential to provide thick descriptions of social interactions and individual values in large-scale, sometimes population level, and settings. At the same time, digitalization of large corpuses of legal, administrative and political texts allow for dynamic analysis of evolving social ideas and issues. At the same time, most digital data do not arrive in simple accessible, quantifiable and comparable forms, but as text, sound and pictures. Advanced Social Data Science II is focused on unstructured data and methods for processing, transforming and dealing with complex and high dimensional data.
The course presents classic unsupervised learning methods for characterizing and developing typologies and categories of individual and social behaviour, networks and ideas. Furthermore, it introduces state-of-the-art methods of self-supervision and transfer learning for classifying complex unstructured data such as text and images, and relates such data-driven methods to existing theoretical methods and models, as well as quantitative and qualitative methods, in the social sciences.

**Learning outcome**

At the end of the course, the students are able to:

**Knowledge**

- Explain the differences between and capabilities of neural network architectures such as CNN, RNN, LSTM and Attention based models.
- Account for various learning strategies, algorithms as well as approaches: clustering and unsupervised learning, supervised learning, semi-supervised learning, transfer learning, multi-task learning.
- Account for the potential of different representations, encodings and transformations of text, structured and unstructured.

**Skills**

- Extract reliable information from text data using supervised learning and techniques from natural language processing.
- Handle advanced matrix and tensor manipulation using a major deep learning framework (e.g. PyTorch, TensorFlow)
- Apply state-of-the-art deep transfer learning to classify unstructured data.
- Master computer vision methods to extract features from image data.

**Competencies**

- Integrate theoretical and applied knowledge within the field of Social Data Science and formulate compelling research questions given an unstructured dataset.
- Construct validated and documented data sets for social science from unstructured text and media data.
- Independently carry out an end-to-end analysis given an unstructured dataset of text or images, including exploratory analysis and discovery using unsupervised methods and supervised learning for measurement, and assessment of model-based biases.
- Critically evaluate the implications of results, considering model limitations and biases, and systematic noise introduced by data collection and sampling methods.
• Communicate results using comprehensive statistics and modern visualization methods in particular plotting new data types to specialists within the academic field.

Teaching and working methods
This class will be taught using a combination of lectures and hands-on lab exercises working with problem sets.

Prerequisites
To be eligible for the exam in ASDSII, it is a requirement that students have completed a number of compulsory problem sets based on a social science question combining knowledge of social science research design with methods from the course. The problem sets must be completed in groups and must be approved by the instructor.

Exam form
The exam is integrated with the exam in Digital Methods (see also section 6.7), with separate assessment and grading.

Group-based written assignment in the shape of a wiki, that students are expected to write in groups of 3-4 students. The wiki should contain text (method accounts, analyses etc.) and formulate and evaluate an explicit research question. In addition, it may contain documentation in the shape of code, field-notes, data visualizations, and so on, as relevant to the project.

Specifics about the ASDSII assessment:
The ASDSII assessment is based on the technical aspects of the wiki material. Therefore, students must formulate a separate wiki section in which the operative use of data is described and discussed. E.g. classification of complex unstructured data or characterization or development of typologies and categories. Aspects of the project pertaining to the ASDSII exam must be clearly marked in the wiki as a stand-alone page.

Re-examination: The second and third exam attempts will be based on a written assignment with a new problem statement, approved by the teacher. It will be possible to do the re-examination individually or in groups of 3 or 4 students.
Ad1) the student fails one of the **courses**: the re-examination pertains only to the course not passed.
Ad2) the student fails both courses: the re-examination will take place separately on the two courses, i.e. the re-examination is not an integrated exam.

**Assessment**
The exam is assessed in accordance with the Danish 7-point grading scale.
The exam is assessed by internal examination.

**6.7 Digital Methods**
Students must follow the Digital Methods course concurrently with Advanced Social Data Science II.

**Extent**
The course amounts to 7.5 ECTS credits.

**Course description**
Using digital methods is a specific approach to doing digital social research. In digital methods, focus is placed on the digital media contexts where data is generated as a by-product of social interaction, and on new ways of combining quantitative and qualitative methods of digital inquiry and analysis. This course provides students with practical skills in implementing three sets of computer-assisted qualitative methods: exploratory network analysis, digital ethnography, and content analysis. As such, it supplements the various quantitative techniques taught in other courses on the program, as well as provides tools for mixing qualitative methods with textual and/or visual quantitative data into qualitative-quantitative social-science analyses. Students train these skills by conducting their own integrated mapping of a public issue, involving networks, ideas, and behaviour across individual and organizational levels and across multiple digital platforms.

**Learning outcome**
At the end of the course, the students are able to:

*Knowledge*
• Show familiarity with the basic techniques, use scenarios, and validity criteria of computer-assisted qualitative methods, i.e. digital ethnography, content analysis, and exploratory network analysis.
• Account for the procedures, potentials, and pitfalls of combining qualitative and quantitative data sources, including in integrated qualitative-quantitative ways.
• Account for the relationship between digital methods’ emphasis on the media contexts of digital data and the broader questions, claims and biases of social data science.

Skills
• Identify the procedures of qualitative content analysis for designing appropriate semantic categories, including for use in subsequent machine learning with quantitative text (and/or visual) data.
• Extract, and communicate patterns of networks, ideas, and behaviour characteristic of specific social settings and public issues, using the appropriate qualitative method(s).
• Combine qualitative data with a quantitative data source, thereby integrating heterogeneous digital data formats into comprehensive social analyses.

Competencies
• Evaluate and analyse a social data problem from both qualitative and quantitative perspectives, including determining when to deploy which method designs.
• Design and implement small-scale digital ethnography campaigns, along with exploratory network analysis and content analysis, to obtain insights into social networks, ideas, and behaviour at individual and organizational levels.
• Combine qualitative and quantitative sources of data, as well as forms of narration and visualization, into persuasive qualitative-quantitative reports on social data problems for a range of organizational use scenarios.

Teaching and working methods
Teaching combines lectures and in-class method exercises with extensive out-of-class project work. Throughout the course, students train their qualitative method skills by conducting their own project, i.e. digitally mapping a public issue (with some teacher assistance available) chosen from within a unifying theme (e.g. activism, sustainable transition, or similar). In-class exercises gives priority to providing students first-hand skills in closely combining digital data formats into composite social analyses, both qualitative and quantitative, in ways that mirror realistic use scenarios in a range of contexts where social data analysis is a key component.

Prerequisites
To be eligible for the exam in Digital Methods, it is a requirement that students have completed and passed four project-related assignments. The assignments can be submitted individually or in groups of 3 or 4 students and must be approved by the instructor. The length of each assignment must be no longer than 3 standard pages.

**Exam form**

The exam is integrated with Advanced Social Data Science II, with separate assessment and grading.

Group-based oral exam with prior written assignment (in the shape of a wiki) in groups of 3-4 students. The group-based wiki should contain text (method accounts, analyses etc.), and formulate and evaluate an explicit research question. In addition, it may contain documentation in the shape of code, field-notes, data visualizations, and so on, as relevant to the project.

Specifics about the Digital Methods assessment:
The Digital Methods assessment is based on an overall assessment of the students’ ability to formulate and implement a coherent digital social research framework. Specifically, students are evaluated on the ability to integrate the different parts of the wiki such as research question, account for methods (digital ethnography, content analysis and qualitative network analysis), ASDSII section etc. Note that the contents of the ASDSII section is not part of the Digital Methods assessment.

Re-examination: The second and third exam attempts will be based on a written assignment with a new problem statement, approved by the teacher. It will be possible to do the re-examination individually or in groups of 3 or 4 students.

   Ad1) the student fails one of the courses: the re-examination pertains only to the course not passed.
   Ad2) the student fails both courses: the re-examination will take place separately on the two courses, i.e. the re-examination is not an integrated exam.

**Assessment**
The exam is assessed in accordance with the Danish 7-point grading scale. The written assignment and the oral exam are given equal weight for the final grade given.

The exam is assessed by internal examination.

6.8 Elective courses offered by the programme

6.8.1 Data Collection, Processing and Analysis

Extent

Students can enrol in this course for either 15 or 30 ECTS credits.

Course description

The purpose of this course is to provide students with an opportunity for collecting and working with data which is relevant to their master’s theses. The course consists in participating in a data collection project such as running an experiment or scraping data from the internet. This includes the preliminary processing and basic analysis.

Students are only allowed to pass this course once during the master’s programme.

Learning outcome (15 ECTS)

At the end of the course, the students are able to:

Knowledge

- Describe the choice of method for doing research within social data science and the knowledge it produce.
- Be knowledgeable of theoretical terms and research themes that can be used to understand relevant social data science problems within an empirical material.

Skills

- Carry out a smaller data collection taking a point of departure in an independent problem formulation.
- Assess problem statement and research questions in relation to the empirical material.

Competencies
- Organize the empirical material systematically, taking into consideration research ethics.
- Reflect critically on the methodological and analytical process of collecting data.

**Learning outcome (30 ECTS)**

At the end of the course, the students are able to:

**Knowledge**
- Describe the use of different methods for doing research within social data science and the knowledge they produce.
- Be knowledgeable of theoretical terms and research themes that can be used to understand relevant social data science problems within an empirical material.

**Skills**
- Carry out data collection taking a point of departure in an independent problem formulation.
- Collect relevant empirical material.
- Assess problem statement and research questions in relation to the empirical material and adjust these when relevant.

**Competencies**
- Organize the empirical material systematically, taking into consideration research ethics.
- Reflect critically on the methodological and analytical process of collecting data and applying it for commercial and research purposes.

**Teaching and working methods**

This course is conducted primarily as self-study. At the beginning of the semester, the Head of Studies assigns students into supervision clusters.

During the semester students must participate in workshops, organised by the cluster supervisor, focusing on presenting their social data science material and analysis. The output from the workshops are portfolio items.

**Prerequisites**

To be eligible for exam, the projects must be pre-approved by course responsible(s) at the start of the third semester. In addition, participation in the workshops is compulsory. The number and type of workshops depends on the scope of ECTS credits taken.
Exam form
Written exam (portfolio) submitted individually or in groups. Students in the same group must be enrolled for the same number of ECTS. The portfolio exam must contain all the portfolio assignments handed in during the course and an overview of the collected data material.

For 15 ECTS credits, the written portfolio assignment must be no longer than 10 pages for 1 person and 15 pages for two persons, who write together.

For 30 ECTS credits, the written portfolio assignment must be no longer than 20 pages for 1 person and 30 pages for two persons, who write together.

Re-examination: The second and third exam attempts run identical to the ordinary examination.

Assessment
The exam is assessed according to the Danish 7-point grading scale.
The exam is assessed by an internal examiner.

6.8.2 Co-curricular Written Assignment
Extent
The course amounts to 7.5 ECTS credits.

Course description
Co-curricular written assignments are available for students who want to enhance their knowledge and competencies in a particular field of social data science.

Students are only allowed to pass this course once during the master’s programme.

Learning outcome
The students should demonstrate their mastery of the following:

Knowledge
• Critically and independently reflect upon and discuss the applied social data science theories and methods within the chosen area of study.
• Account for the validity, scope and usefulness of relevant data as part of the project.

Skills
• Apply relevant theories and methods on a selected area of study.
• Be able to independently summarize and analyse a topic in a well-structured written report.

Competencies
• Independently identify and select relevant theories to examine a chosen area of study.
• Independently select, analyse and apply academic literature relevant to a specific problem statement.

Teaching and working methods
Students enter into supervision agreements with one of the full-time teachers who are involved in the Social Data Science degree programme or an affiliated part-time lecturer, a PhD-student or a post doc. Supervision of co-curricular written assignments is limited to initially assisting with literature suggestions and/or the structuring and scope of the analysis and contents in one meeting.

Exam form
The assignment may be written individually or in groups. The length of the co-curricular written assignment follows the general length prescriptions for written exams, cf. section 5.

Re-examination: The second and third exam attempts run identical to the ordinary examination.

Assessment
The exam is assessed in accordance with the Danish 7-point grading scale.

The exam is assessed by the supervisor.

6.8.3 Academic internship

Extent
It is possible to replace subject elements corresponding to 15 or 30 ECTS credits on the master’s degree programme in Social Data Science with an academic internship.
Course description
The purpose of the academic internship is to provide students with an opportunity to get hands-on-experience for research and/or commercial or social purpose. Through a formalized attachment to a company, public institution, research institute or similar the student will perform tasks and at the same time be able to apply academic skills in a practical context.

Students are only allowed to pass this course once during the master’s programme.

During the academic internship, the student will:
- Submit preliminary considerations once regarding their internship report and receive feedback from the supervisor.
- Submit an internship report for the exam.

Students enrolled for 30 ECTS will also:
- Submit preliminary considerations twice regarding their social data scientific assignment and receive feedback from the supervisor.
- Submit a social data scientific assignment for the exam.

Learning outcome (15 ECTS)
At the end of the academic internship, the students are able to:

Knowledge
- Critically reflect upon the acquired insights into and practical experience with the execution of work tasks relevant to social data science.

Skills
- Apply relevant theories and methods in a practical context.
- Independently summarize and analyse a practical case in a well-structured written report.

Competencies
- Independently identify and select relevant theories and methods to examine a practical case.

Learning outcome (30 ECTS)
At the end of the academic internship, the students are able to:

Knowledge
• Critically and independently reflect upon and discuss the applied social data science theories and methods to a chosen topic.
• Account for the validity, scope and usefulness of relevant data as part of the social data scientific assignment.

Skills
• Apply relevant theories and methods in a practical context.
• Independently summarize and analyse a topic in a well-structured written assignment.

Competencies
• Independently identify and select relevant theories to examine a practical case.
• Independently select, analyse and apply academic literature relevant to a specific problem statement.

Teaching and working methods
This course is conducted primarily as self-study.

Internal supervisor
Students enter into supervision agreement with one of the full-time teachers who are involved in the Social Data Science degree programme or an affiliated part-time lecturer, a PhD-student or a post doc. The supervisor is responsible for approving and monitoring the academic internship, and for ensuring that the learning outcome is achieved.

External supervisor
Students must be assigned to an external supervisor from the place of internship. The external supervisor continuously develops and evaluates the academic internship together with the student in accordance with the expected learning outcome.

Extent
The academic internship comprises 15 or 30 ECTS.

<table>
<thead>
<tr>
<th>Extent of working hours</th>
<th>Field of work</th>
<th>Number of hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 ECTS</td>
<td>Working hours at the internship site.</td>
<td>327 hours</td>
</tr>
<tr>
<td>Extent of working hours</td>
<td>Field of work</td>
<td>Number of hours</td>
</tr>
<tr>
<td>-------------------------</td>
<td>--------------------------------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>No. of ECTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Internship report, including preliminary considerations</td>
<td>50 hours</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>412 hours</strong></td>
</tr>
<tr>
<td><strong>30 ECTS</strong></td>
<td>Working hours at the internship site.</td>
<td>650 hours</td>
</tr>
<tr>
<td></td>
<td>Internship report and social data scientific assignment, including preliminary considerations</td>
<td>175 hours</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>825 hours</strong></td>
</tr>
</tbody>
</table>

**Exam requirements**

All students must in one instances submit considerations regarding their internship report to the internal supervisor, and document that the number of working hours has been completed (e.g. internship contract).

Moreover, students enrolled for 30 ECTS must in two instances submit considerations regarding their social data scientific assignment to the internal supervisor.

**Exam form – Internship report**

- Internship report submitted individually, maximum 5 standard pages.
- The exam is marked as pass/fail.
- The exam is assessed by the internal supervisor.

Re-examination: The second and third exam attempts run identical to the ordinary examination.

**Exam form – Social data scientific assignment (Only 30 ECTS enrolment)**

- Social data scientific assignment submitted individually, maximum 20 standard pages.
- The exam is assessed according to the Danish 7-point grading scale.
- The exam is assessed by the internal supervisor.

Re-examination: The second and third exam attempts run identical to the ordinary examination.
6.9 Master's Thesis

Extent
The course amounts to 30 ECTS credits.

Course description
The thesis is the conclusion of the degree. Students must place this on their final semester of the master’s programme. It is a requirement that 90 ECTS-credits have been passed before the thesis writing period begins.

The purpose of the thesis is for students to acquire research-based competencies by conducting a social data science investigation of a problem of their choosing. This includes identifying a problem of investigation through gathering and analysing relevant social data and applying methodological, theoretical, ethical and legal perspectives in integrating social science and data science. Relevant data may include, but is not limited to, big social data from e.g. social media platforms or other sources.

Learning outcome
The theses must demonstrate that the students are able to:

Knowledge
- Account for the scientific and social potentials of the investigation or development.
- Relate critically to existing knowledge within this area.
- In connection with the oral defence, the student must demonstrate a command of the methodologies applied in connection with the preparation of the thesis.

Skills
- Formulate a precise problem statement/research question.
- In connection with the oral defence, the student must be able to account for the issue of the thesis and its clarification in a clear and comprehensible manner.
- Structure and argue convincingly while processing the problem.
- If the thesis contains empirical data or algorithms, critically assess the quality and use of it including any legal, ethical, political or other relevant considerations.
- Justify the design and discuss the choice of methodology.
• Apply relevant social science theory in the analysis and present independent observations on it.
• Justify in what sense new knowledge has been generated or new light shed on existing knowledge and qualify this in terms of usefulness, topicality, theory or methodological progress.
• Account for the distinct social science contribution to knowledge made by the analysis and how it is part of a social data science approach.
• Discuss the knowledge produced critically and put it into perspective.

**Competencies**

• Plan, structure and implement a social data science investigation in accordance with scientific standards.
• If the project is a collaborative investigation with an external partner, take responsibility for coordinating the process with the company/organization.
• Take responsibility for collaboration with fellow student, supervisor, and external partner; including handling interdisciplinary differences, political or commercial interests, time schedules etc.
• Independently take responsibility for own academic development.

**Registration**

Students must register for the thesis in accordance with the rules described in section 4.2.4 of the Curricula’s Common Part.

It is not possible to cancel the thesis contract once approved by the University. For a detailed description of the registration procedures see the study pages in KUnet.

**Teaching and working methods**

Students are assigned to a cluster consisting of 4-6 students and two supervisors among the group of full-time teachers at the Faculty of Social Sciences. The cluster will meet weekly during the semester to discuss how to structure data collection, analysis and writing. The meetings are not compulsory.

The assignment of students to supervision clusters is done by a full-time lecturer appointed by the Head of Studies. The assignment is based on students’ requests as well as overlap between the proposed thesis format, supervisors’ profiles and overlap with the proposed format of other students under supervision. In unusual circumstances, students may apply to the Board of Studies for an external supervisor.
Please note that supervision is only offered as part of the first master’s thesis contract.

Exam form
The thesis is defended in an oral defence based on the student's written presentation. Oral defence lasts one hour in total, and the student has approximately 20 minutes to make the presentation.

The thesis must include a summary which summarizes the main points of the thesis and stipulates how the student arrived at these points. The summary must be written in another language than Danish, even if the thesis is not in Danish. The summary may be in English, German or French. Swedish and Norwegian do not count as foreign languages, cf. the Examination Order.

Theses may be written individually or by up to three students in collaboration. If written by one student, the total page of documents in the thesis must be no longer than 40 standard pages; with two students the limit is 60 pages; with three 80 pages.

Students co-writing their thesis defend it together.

Re-examination: Students who fail to submit their theses by the stipulated deadline must register for a second exam attempt (and, if needed, a third attempt) under the rules described in section 4.2.5 of the Curricula’s Common Part.

The student cannot use second and third attempt if the maximum study time is exceeded. In that case, the student is withdrawn from the university regardless of whether all attempts have been used.

Thesis formats
Students can choose the following formats:

- Classic thesis
- Scientific article(s)
- Annotated dataset
- Report for external partner

Classic thesis
The thesis must fulfil the standard requirements above as well as those in the Curricula’s Common Part.
Scientific working paper
The thesis must fulfil the standard criteria and contain the following main components:

- A companion framing text containing a more comprehensive introduction and background giving a comprehensive account of the theory and methods employed, outlining the social scientific/academic background for the study. Any ethical or legal concerns, e.g. about data collection, data processing, fieldwork, application of algorithms, should be analysed and critically reflected upon.
- One scientific working paper. The working paper should be written with the style, format, and length of a “letter” or “short article” in a top social science journal of the student’s choosing, emphasizing how the thesis contributes to the extant literature.

Annotated dataset
The thesis must fulfil the standard criteria and contain the following main components:

- A companion framing text containing a more comprehensive introduction and background giving a comprehensive account of the theory and methods employed, outlining the social scientific/academic background for the study. Any ethical or legal concerns, e.g. about data collection, data processing, fieldwork, application of algorithms, should be analysed and critically reflected upon. The companion framing document should also state how the dataset is useful for new research and/or for commercial as well as social purposes.
- A detailed annotated dataset, including a thorough account of how data was produced, cleaned, categorized, and/or analysed, as relevant for the intended purpose of the dataset.

Report for external partner
The thesis must fulfil the standard criteria and contain the following main components:

- A report, primarily addressed to an external party, in which a problem from internship/project-oriented work or data collection is analysed.
- A companion paper containing a more comprehensive introduction and background giving a comprehensive account of the theory and methods employed, outlining the social scientific/academic background for the study, the social context and relation to the external partner. The paper should challenge and discuss the project-oriented work for the external partner, targeted at an academic audience. Any ethical or legal concerns, e.g. about data collection, data processing, fieldwork, application of algorithms, should be analysed and critically reflected upon.

Assessment
The master’s thesis and the oral defence are assessed according to the Danish 7-point grading scale. The exam is assessed by an external examiner.
The summary is included in the assessment of the thesis. The assessment of the thesis is weighted in such a way that the written part weighs approx. 2/3 and the oral part approx. 1/3.

Writing and spelling skills are part of the overall assessment of the thesis. However, the academic content will be weighed more heavily. The Study Board might grant an exemption from this rule in case of impairment, cf. the Examination Order.

**Language**

Danish or English.