

Data & Things

Title	Data & Things
Semester	F2025
Master programme in	Computer Science
Type of activity	Course
Teaching language	English
Study regulation	Read about the Master Programme and find the Study Regulations at ruc.dk

REGISTRATION AND STUDY ADMINISTRATIVE

You register for activities through [stads selvbetjening](#) during the announced registration period, which you can see on the [Study administration homepage](#).

Registration When registering for courses, please be aware of the potential conflicts and overlaps between course and exam time and dates. The planning of course activities at Roskilde University is based on the recommended study programmes, which should not overlap. However, if you choose optional courses and/or study plans that goes beyond the recommended study programmes, an overlap of lectures or exam dates may occur depending on which courses you choose.

Number of participants

ECTS 10

Responsible for the activity
Jens Ulrik Hansen (jensuh@ruc.dk)
Hua Lu (luhua@ruc.dk)

Head of study Henrik Bulskov (bulskov@ruc.dk)

Teachers

Study administration IMT Registration & Exams (imt-exams@ruc.dk)

Exam code(s) U60058

ACADEMIC CONTENT

Overall objective	Advanced data solutions and complex device systems.
Detailed description of content	This course focuses on building data centric applications that utilize data to create new insights or features. In doing this, we need to understand how to analyze data and create statistical and machine learning models, as well as learning how to process, transform, and manage data. In managing data, we will go beyond the classical relational databases and cover topics such as parallel and distributed data systems, partial and graph databases, and data from IoT devices. Moreover, we will cover how to put data products, such as machine learning models, into production and monitor their performance (ML Ops). Thus, this course cover both hands-on introductions to data science, machine learning, data engineering, ML Ops, as well as building complex data centric systems that may utilize IoT devices and external data sources as input to statistical and machine learning models that may result in visualizations, features, or effects into the environment.
Course material and Reading list	Course materials will consist of part of books, papers, etc. The specific materials will be announced on Moodle for each lecture.
Overall plan and expected work effort	The course will have a total workload of 270 hours consisting of approximately: <ul style="list-style-type: none"> • 76 hours of lectures and exercises, • 140 hours of preparation over an 8 week course period and • 54 hours for the exam and preparation before the course.
Format	
Evaluation and feedback	Evaluation form to be filled out (anonymously) plus open discussion on the last course day

Programme
ASSESSMENT

Overall learning outcomes	After completing this activity, students will be able to: <ul style="list-style-type: none"> • analyse, implement, and verify complex data solutions to solve problems within complex IT systems.
---------------------------	--

- demonstrate knowledge of modern data storages, and data engineering and science.
- understand and implement solutions that integrate computation into the environment and use several devices and systems.
- design and implement coordination for systems with many software and hardware components and interfaces suitable for ubiquitous computing.

Individual oral exam based on a written product..

The character limit of the written product is maximum 48.000 characters, including spaces.

The character limits include the cover, table of contents, bibliography, figures and other illustrations, but exclude any appendices.

Form of examination

Time allowed for exam including time used for assessment: 20 minutes.
The assessment is an overall assessment of the written product(s) and the subsequent oral examination.

Permitted support and preparation materials for the oral exam: All.

Assessment: 7-point grading scale.

Moderation: Internal co-assessor.

Form of Re-examination

Samme som ordinær eksamen / same form as ordinary exam

Type of examination in special cases

Examination and assessment criteria

Information about the written product: - The written product will consist of answers to selected exercises – these will be selected among those that have already been done in class. Only some of the exam topics will have such selected exercises. - The list of selected exercises will be made public on the last day of class. - The handed in answers to the selected exercises should be in the format of a Jupyter Notebook. A template Jupyter notebook will be provided on Moodle. - The students can hand in in self-formed groups, which Eksamen.ruc.dk is set up for. In that case, the students can only hand in one joint Jupyter Notebook per group.

Information about the written product: - At the beginning of the exam, the student draw a random number. Each number will correspond to an exam topic. (The list of exam topics roughly corresponds to the different classes and will be announced at the beginning of the course). - The student then presents on the topic (3-5 min) including potential selected exercises handed in as part of the written product. This is followed by questions about the presentation and the exam question from the examiners (5-10 min). - At the end, the examiners might relate their questions to the full curriculum (i.e., some of the other exam topics). - For each of the exam topics, the student is expected to know the central concepts, methods, theories, and problems discuss in class and be able to explain and exemplify them. Moreover, for those exam topics where there are selected exercises handed in as part of the written product, the student is expected to be able to explain how they solved the exercises and be able to explain their entire code.

Exam code(s) Exam code(s) : U60058