

Experiments and Models – Linear Response: Structure and Dynamics of Condensed Matter

Title	Experiments and Models – Linear Response: Structure and Dynamics of Condensed Matter
Semester	E2022
Master programme in	Physics and Scientific Modelling
Type of activity	Course
Teaching language	English
Study regulation	Read about the Master Programme and find the Study Regulations at ruc.dk Læs mere om uddannelsen og find din studieordning på ruc.dk

REGISTRATION AND STUDY ADMINISTRATIVE

Registration	<p>Sign up for study activities at stads selvbetjening within the announced registration period, as you can see on the Studyadministration homepage.</p> <p>When signing up for study activities, please be aware of potential conflicts between study activities or exam dates.</p> <p>The planning of activities at Roskilde University is based on the recommended study programs which do not overlap. However, if you choose optional courses and/or study plans that goes beyond the recommended study programs, an overlap of lectures or exam dates may occur depending on which courses you choose.</p>
Number of participants	
ECTS	10
Responsible for the activity	Dorthe Posselt (dorthe@ruc.dk) Kristine Niss (kniss@ruc.dk)
Head of study	Studieleder for Fysik (fys-sl@ruc.dk)
Teachers	
Study administration	INM Studieadministration (inm-studieadministration@ruc.dk)
Exam code(s)	U60191

ACADEMIC CONTENT

Overall objective	The course in Experiments and Models is intended to train the student's skills to conduct experiments, treat data and construct models for physical systems. The students will acquire exemplary knowledge on the interplay between theory, models and experiments and learn to bring them into play in a concrete context.
Detailed description of content	The thematic focus in this course is on experimental methods and models of dynamics and structure of materials, particularly liquids and soft matter.
Course material and Reading list	<p>Fundamentals of Condensed Matter and Crystalline Physics - by David L. Sidebottom, Cambridge University Press</p> <p>The course material will be a mixture of notes, lab-instructions and textbook material. The pensum will be specified on the moodle-page of the course.</p>
Overall plan and expected work effort	<p>The expected work effort of the students is approximately 270 hours. The hours are distributed between different activities. The times indicated here are estimates.</p> <ul style="list-style-type: none"> • 48 hours class (lectures and small experiments) • 12 hours for a selected experiment • 62 hours preparation for class (reading and problem solving) • 40 hours working with portfolio part A (small experiments) • 56 hours working with portfolio part B (selected experiment) • 50 hours preparation for exam • 1 hour exam
Format	
Evaluation and feedback	<p>The course includes formative evaluation based on dialogue between the students and the teacher(s).</p> <p>Students are expected to provide constructive critique, feedback and viewpoints during the course if it is needed for the course to have better quality. Every other year at the end of the course, there will also be an evaluation through a questionnaire in SurveyXact. The Study Board will handle all evaluations along with any comments from the course responsible teacher.</p> <p>Furthermore, students can, in accordance with RUCs 'feel free to state your views' strategy through their representatives at the study board, send evaluations, comments or insights from the course to the study board during or after the course.</p>
Programme	<p>The first part of the course focuses on dynamical properties of materials. A key part of the course is Electric circuit analogies used as a tool to visualize and model simple linear differential equations describing fundamental properties of materials. This part of the course includes two experiments which are performed by all students (in small groups) and</p> <p>The second part of the course deals with structure of materials and basic scattering theory.</p>

In the third part of the course students perform a larger experiment in small groups. The experiment will be within the field of structure and dynamics of amorphous and soft matter.

Details of the plan will be on the course Moodle-page.

ASSESSMENT

Overall learning outcomes

After completing the course the students will be able to

- demonstrate skills in using certain technical apparatus for physics experiments e.g., electronic measuring equipment and data collection on computers
- analyse and present the data obtained
- demonstrate knowledge, understanding and insight into selected elements of electrodynamics, continuum mechanics, thermodynamics and condensed matter physics in a concrete experimental context
- demonstrate understanding and reflection on the overview of the experimental methods used and their status in physics
- apply complex functions and linear differential equations in order to model experimental results.
- define basic scattering theory and use it to describe theory and dynamics of liquids
- discuss the importance of the experimental results achieved and relate them to relevant theories and models.

Form of examination

Individual oral exam based on a portfolio.

The character limit of the portfolio is 1,200-120,000 characters, including spaces. Examples of written products are exercise responses, talking points for presentations, written feedback, reflections, written assignments. The preparation of the products may be subject to time limits.

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

Time allowed for exam including time used for assessment: 30 minutes. The assessment is an assessment of the oral examination. The written product(s) is not part of the assessment.

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

The exam starts with a short presentation by the student on a selected experiment and is followed by questions and discussions which may cover all parts of the curriculum.

The student will be evaluated on their ability to

- present and discuss the experiments and theory of the course in a relevant manner
- analyse and present the data obtained
- demonstrate knowledge, understanding and insight into selected elements of electrodynamics, continuum mechanics, thermodynamics and condensed matter physics in a concrete experimental context
- demonstrate knowledge of the theory relevant for interpreting the experiments (e.g. complex response functions and scattering theory)
- demonstrate understanding and reflection on the overview of the experimental methods used and their status in physics
- discuss the importance of the experimental results achieved and relate them to relevant theories and models.

Exam code(s) Exam code(s) : U60191

Course days:

Hold: 1

Experiments and Models (PSM) - Room: Fysik B in building 27

time 05-09-2022 10:15 til
05-09-2022 12:00

Teacher Dorthe Posselt (dorte@ruc.dk)
Kristine Niss (kniss@ruc.dk)
Tina Hecksher (tihe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 06-09-2022 10:15 til
06-09-2022 12:00

Teacher Dorthe Posselt (dorte@ruc.dk)
Tina Hecksher (tihe@ruc.dk)
Kristine Niss (kniss@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 09-09-2022 12:15 til
09-09-2022 14:00

Teacher Tina Hecksher (tihe@ruc.dk)
Kristine Niss (kniss@ruc.dk)
Dorthe Posselt (dorthe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 12-09-2022 10:15 til
12-09-2022 12:00

Teacher Dorthe Posselt (dorthe@ruc.dk)
Kristine Niss (kniss@ruc.dk)
Tina Hecksher (tihe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 13-09-2022 10:15 til
13-09-2022 12:00

Teacher Kristine Niss (kniss@ruc.dk)
Tina Hecksher (tihe@ruc.dk)
Dorthe Posselt (dorthe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 16-09-2022 12:15 til
16-09-2022 14:00

Teacher Kristine Niss (kniss@ruc.dk)
Tina Hecksher (tihe@ruc.dk)
Dorthe Posselt (dorthe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 19-09-2022 10:15 til
19-09-2022 12:00

Teacher Tina Hecksher (tihe@ruc.dk)
Kristine Niss (kniss@ruc.dk)
Dorthe Posselt (dorthe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 20-09-2022 10:15 til
20-09-2022 12:00

Teacher Kristine Niss (kniss@ruc.dk)
Dorthe Posselt (dorthe@ruc.dk)
Tina Hecksher (tihe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 23-09-2022 12:15 til
23-09-2022 14:00

Teacher Dorthe Posselt (dorthe@ruc.dk)
Tina Hecksher (tihe@ruc.dk)
Kristine Niss (kniss@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 26-09-2022 10:15 til
26-09-2022 12:00

Teacher Kristine Niss (kniss@ruc.dk)
Dorthe Posselt (dorthe@ruc.dk)
Tina Hecksher (tihe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 27-09-2022 10:15 til
27-09-2022 12:00

Teacher Tina Hecksher (tihe@ruc.dk)
Dorthe Posselt (dorthe@ruc.dk)
Kristine Niss (kniss@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 30-09-2022 12:15 til
30-09-2022 14:00

Teacher Kristine Niss (kniss@ruc.dk)
Tina Hecksher (tihe@ruc.dk)
Dorthe Posselt (dorthe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 03-10-2022 10:15 til
03-10-2022 12:00

Teacher Dorthe Posselt (dorthe@ruc.dk)
Tina Hecksher (tihe@ruc.dk)
Kristine Niss (kniss@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 04-10-2022 10:15 til
04-10-2022 12:00

Teacher Kristine Niss (kniss@ruc.dk)
Dorthe Posselt (dorthe@ruc.dk)
Tina Hecksher (tihe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 07-10-2022 12:15 til
07-10-2022 14:00

Teacher Kristine Niss (kniss@ruc.dk)
Tina Hecksher (tihe@ruc.dk)
Dorthe Posselt (dorthe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 10-10-2022 10:15 til
10-10-2022 12:00

Teacher Tina Hecksher (tihe@ruc.dk)
Kristine Niss (kniss@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 11-10-2022 10:15 til
11-10-2022 12:00

Teacher Kristine Niss (kniss@ruc.dk)
Dorthe Posselt (dorthe@ruc.dk)
Tina Hecksher (tihe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 14-10-2022 12:15 til
14-10-2022 14:00

Teacher Kristine Niss (kniss@ruc.dk)
Tina Hecksher (tihe@ruc.dk)
Dorthe Posselt (dorthe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 17-10-2022 10:15 til
17-10-2022 12:00

Teacher Tina Hecksher (tihe@ruc.dk)
Kristine Niss (kniss@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 18-10-2022 10:15 til
18-10-2022 12:00

Teacher Tina Hecksher (tihe@ruc.dk)
Kristine Niss (kniss@ruc.dk)
Dorthe Posselt (dorthe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 21-10-2022 12:15 til
21-10-2022 14:00

Teacher Kristine Niss (kniss@ruc.dk)
Tina Hecksher (tihe@ruc.dk)
Dorthe Posselt (dorthe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 24-10-2022 10:15 til
24-10-2022 12:00

Teacher Kristine Niss (kniss@ruc.dk)
Tina Hecksher (tihe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 25-10-2022 10:15 til
25-10-2022 12:00

Teacher Tina Hecksher (tihe@ruc.dk)
Kristine Niss (kniss@ruc.dk)
Dorthe Posselt (dorthe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 28-10-2022 12:15 til
28-10-2022 14:00

Teacher Kristine Niss (kniss@ruc.dk)
Tina Hecksher (tihe@ruc.dk)
Dorthe Posselt (dorthe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 31-10-2022 10:15 til
31-10-2022 12:00

Teacher Tina Hecksher (tihe@ruc.dk)
Kristine Niss (kniss@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 01-11-2022 10:15 til
01-11-2022 12:00

Teacher Tina Hecksher (tihe@ruc.dk)
Dorthe Posselt (dorthe@ruc.dk)
Kristine Niss (kniss@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 04-11-2022 12:15 til
04-11-2022 14:00

Teacher Tina Hecksher (tihe@ruc.dk)
Kristine Niss (kniss@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 07-11-2022 08:15 til
07-11-2022 16:00

Teacher Tina Hecksher (tihe@ruc.dk)
Kristine Niss (kniss@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 08-11-2022 10:15 til
08-11-2022 12:00

Teacher Dorthe Posselt (dorthe@ruc.dk)
Kristine Niss (kniss@ruc.dk)
Tina Hecksher (tihe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 11-11-2022 12:15 til
11-11-2022 14:00

Teacher Tina Hecksher (tihe@ruc.dk)
Kristine Niss (kniss@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 14-11-2022 08:15 til
14-11-2022 16:00

Teacher Kristine Niss (kniss@ruc.dk)
Tina Hecksher (tihe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 15-11-2022 10:15 til
15-11-2022 12:00

Teacher Dorthe Posselt (dorthe@ruc.dk)
Kristine Niss (kniss@ruc.dk)
Tina Hecksher (tihe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 18-11-2022 12:15 til
18-11-2022 14:00

Teacher Kristine Niss (kniss@ruc.dk)
Tina Hecksher (tihe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 21-11-2022 08:15 til
21-11-2022 16:00

Teacher Tina Hecksher (tihe@ruc.dk)
Kristine Niss (kniss@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 22-11-2022 10:15 til
22-11-2022 12:00

Teacher Dorthe Posselt (dorth@ruc.dk)
Kristine Niss (kniss@ruc.dk)
Tina Hecksher (tihe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 25-11-2022 12:15 til
25-11-2022 14:00

Teacher Kristine Niss (kniss@ruc.dk)
Tina Hecksher (tihe@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 28-11-2022 08:15 til
28-11-2022 16:00

Teacher Tina Hecksher (tihe@ruc.dk)
Kristine Niss (kniss@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 29-11-2022 10:15 til
29-11-2022 12:00

Teacher Kristine Niss (kniss@ruc.dk)
Tina Hecksher (tihe@ruc.dk)
Dorthe Posselt (dorth@ruc.dk)

Experiments and Models (PSM) - Room: Fysik B in building 27

time 02-12-2022 12:15 til
02-12-2022 14:00

Teacher Kristine Niss (kniss@ruc.dk)
Tina Hecksher (tihe@ruc.dk)

Experiments and Models - Hand-in of portfolio (PSM)

time 03-01-2023 10:00 til
03-01-2023 10:00

forberedelsesnorm ikke valgt

forberedelsesnorm D-VIP ikke valgt

Experiments and Models - Exam (PSM)

time	12-01-2023 08:15 til 12-01-2023 16:00
forberedelsesnorm	ikke valgt
forberedelsesnorm D-VIP	ikke valgt

Experiments and Models - Hand-in of portfolio (reexam) (PSM)

time	17-02-2023 10:00 til 17-02-2023 10:00
forberedelsesnorm	ikke valgt
forberedelsesnorm D-VIP	ikke valgt

Experiments and Models - Reexam (PSM)

time	24-02-2023 08:15 til 24-02-2023 16:00
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