

## AFLYSES I E22 Principles of Separation Techniques (Advanced Chemical Methods)

Title	AFLYSES I E22 Principles of Separation Techniques (Advanced Chemical Methods)
Semester	E2022
Master programme in	Kemi / Chemical Biology / Molecular Health Science
Type of activity	Laboratory Course
Teaching language	English
Study regulation	Read about the Master Programme and find the Study Regulations at <a href="http://ruc.dk">ruc.dk</a> Læs mere om uddannelsen og find din studieordning på <a href="http://ruc.dk">ruc.dk</a>

### REGISTRATION AND STUDY ADMINISTRATIVE

Registration	<p>Sign up for study activities at <a href="#">stads selvbetjening</a> within the announced registration period, as you can see on the <a href="#">Studyadministration homepage</a>.</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	The Master Programme/Institute reserves the right to cancel the course if fewer than 8 students are registered for the course.
ECTS	5
Responsible for the activity	
Head of study	Anders Malmendal ( <a href="mailto:amalm@ruc.dk">amalm@ruc.dk</a> )
Teachers	
Study administration	INM Studieadministration ( <a href="mailto:inm-studieadministration@ruc.dk">inm-studieadministration@ruc.dk</a> )
Exam code(s)	U60294

## ACADEMIC CONTENT

Overall objective

The students will learn to use specific chemical methods and the theory behind.

Detailed description of content

**Aim and scope:** The two main elements in the course are analytical chemistry and intermolecular forces. Regarding the former, the ability to detect and separate components in a mixture is essential to the work of most chemists (try to browse a dozen or two job advertisements and see how many call for expertise in chromatography and related analytical techniques).

In Principles of Separation Techniques (PST) you will become acquainted with some of the most important methods and technologies within this field. All separation methods rely on intermolecular interactions.

Thus, there are attractive and repulsive forces between molecules, which depend on their structure, and it follows that different types of molecules may be separated by taking advantage of this. If, for example, an analyze is positively charged it may be separated from other components through the binding to a negatively charged material.

The course will cover an introduction to different types of molecular forces and this should enable you to rationalize the fundamental molecular mechanisms underpinning the separation process in the analytical equipment.

Course material and Reading list

Lecture notes and primary literature will be available on moodle.

Overall plan and expected work effort

Confrontation times:

- 10 lectures = 40 hours
- 5\*4 hours of lectures, problem solving and report help session.
- 5\*4 hours of laboratory exercises
- Preparation of confrontation hours: 40 hours
- Preparation of 5 reports 40 hours
- Preparation of Exam+Exam 15 hours

**Total = 135 hours = 5 ETCS**

The student is expected to attend lectures and Laboratory exercises.

To qualify for the exam you must have shown reasonable attendance to the lectures, participated in at least 80% of the exercises and made all power point presentations of the exercises.

Format

Evaluation and feedback

The course includes formative evaluation based on dialogue between the students and the teacher(s).

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.

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 form the course to the study board during or after the course.

#### Programme

1) Four 4 hours lecture and problem solving sessions

2) One theoretical laboratory session

3) Five practical laboratory exercises which could be:

Isothermal calorimetry (ITC), Size Exclusion Chromatography (SEC), Gel Electroforesis, Reverse -phase HPLC and separation of synthesis product by normal phase preparative column chromatography.

PST includes lectures and problem solving in the class and some regular lab exercises. Subsequent to each exercise you must prepare a "report" in the form of a power point presentation, which addresses main chemical ideas, principles and perspective as well as the questions in the instruction.

#### ASSESSMENT

##### Overall learning outcomes

After completing the course the student will be able to:

- perform measurements, experiments and simulations through the use of specific chemical methods
- operate instruments and process data obtained from specific chemical methods
- observe, analyse and interpret data obtained by the use of specific chemical methods
- incorporate data obtained from specific chemical methods in chemical research questions
- evaluate own and others' data obtained from specific chemical methods
- display knowledge and understanding of the molecular characteristics behind specific chemical methods
- display knowledge and understanding of the principles behind specific chemical methods
- to select the optimal methods / the optimal way to perform a specific type of chemical analysis / preparative technique

##### Form of examination

Individual oral exam based on a portfolio.

The character limit of the portfolio is 12,000-36,000 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 overall assessment of the written product(s) and the subsequent oral examination.

Permitted support and preparation materials for the oral exam: Course material and own notes.

	Assessment: 7-point grading scale. Moderation: Internal co-assessor
Form of Re-examination	Same form as the ordinary exam
Type of examination in special cases	
Examination and assessment criteria	<p>The portfolio consists of the power point presentations for each exercise, which addresses main chemical ideas, principles and perspective as well as the questions in the instruction. The portfolio must be handed in the day prior to your exam.</p> <p>At the exam you will randomly pick one of the exercises from the portfolio and present it orally with max 10 slides for 10-12 min. After your talk the examiners will ask some questions regarding the relevant exercise and other parts of the Principles and Separation curriculum. The exams will be graded on the 7-step scale.</p> <p>The assessment criteria for the written part of the exam is the students ability to</p> <ul style="list-style-type: none"> <li>• perform measurements, experiments and simulations through the use of specific chemical methods</li> <li>• operate instruments and process data obtained from specific chemical methods</li> <li>• observe, analyse and interpret data obtained by the use of specific chemical methods</li> <li>• incorporate data obtained from specific chemical methods in chemical research questions</li> <li>• evaluate own and others' data obtained from specific chemical methods</li> <li>• display knowledge and understanding of the molecular characteristics behind specific chemical methods</li> <li>• display knowledge and understanding of the principles behind specific chemical methods</li> <li>• to select the optimal methods / the optimal way to perform a specific type of chemical analysis / preparative technique</li> </ul> <p>The assessment of the oral exam is based on the student's ability to meet the criteria mentioned above and their ability to</p> <ul style="list-style-type: none"> <li>• clearly present and communicate the scientific content of the portfolio</li> <li>• engage in a scientific dialogue and discussion with the examiners</li> </ul> <p>Furthermore, whether the performance meets all formal requirements</p> <p>The character limit of the portfolio is 12,000-36,000 characters, including spaces. The preparation of the products may be subject to time limits.</p> <p>The character limits include the cover, table of contents, bibliography, figures and other illustrations, but exclude any appendices.</p> <p>The assessment is an overall assessment of the written product(s) and the subsequent oral examination.</p>
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