

**FYS4505/FYS9505 – Methods and
instrumentation for nuclear and
particle physics**

**FYS3506/FYS4506 – Nuclear
methods and instrumentation**

FYS4505/FYS9505



Prof. Eda Sahin
Lecturer/Course
responsible
Nuclear Physics Group



Prof. Alex Lincoln Read
Lecturer/Course
responsible
Particle Physics



Prof. Trine Spedstad
Tveter
Lecturer
High-Energy Physics



Dr. Kyrre Ness Sjøbæk
Lecturer (Geant4
simulations)
High-Energy Physics



Vaitian Leander
Marianayagam
Group teacher
Particle Physics Group



Maximilian Andre
Engenes
Group teacher
Particle Physics Group

FYS3506/FYS4506



Prof. Eda Sahin
Lecturer/Course
responsible
Nuclear Physics Group



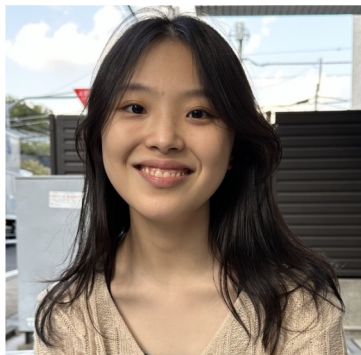
Prof. Ann-Cecilie Larsen
Laboratory/course
responsible
Nuclear Physics Group



Prof. Alex Lincoln
Read
Lecturer
Particle Physics



Prof. Trine Spedstad
Tveter
Lecturer
High-Energy Physics



Hyeji Lee
Group teacher
Nuclear Physics
Group



Samantha Vatnar
Group teacher
Nuclear Physics
Group



Wei Zhang
Group teacher
Nuclear Physics
Group

FYS4505/FYS9505

Course Period

17 Aug 2026 - 20 Nov 2026

Lectures

Time: Mondays/ 08:15-10:00

Place: Ø434*

Laboratory & Group teaching sessions

Time: Fridays/ 12:15-16:00

Labs: VK37 (Physics) & VK33 (Chemistry)

Group teachings: Ø397

*This lecture room will be common to both courses but will be different for the last four weeks for FYS4505/9505.

FYS3506/FYS4506

Course Period

17 Aug 2026 - 18 Nov 2026

Lectures

Time: Mondays/ 08:15-10:00

Place: Ø434

Laboratory & Group teaching sessions

Time: Tuesday-Thursday/ 09:15-12:00 & 13:15-16:00

Labs: VK37 (Physics) & VK33 (Chemistry)

Group teachings: V203

Select student representatives:

We need two students who can

- Receive messages from fellow students
 - About things that don't work optimally
 - About things that are good
- Participate in the subject's final evaluation meeting and convey praise and praise.
- Contributions from students are important for us to be able to provide the world's best education



representatives

FYS4505/FYS9505

**Vilhelm Faldbakken Sørhaug
Victoria Falao**

FYS3506/FYS4506

**Sigtyr Snorri Asbjörnsson Blöndal
Kristin Laurinsdottir Eriksen**

Everything collected in Canvas

Lecture recordings

Post questions

Your "mugshot"

Lab texts, data, scripts, etc

▼ Experiment I: Geiger-Müller counter properties	⋮
📎 Lab_Session_1__GM_counter_properties.pdf	⋮
📎 Jupyter notebook fitDecayData.ipynb	⋮
📎 ROOT script plot_errors.C	⋮
📎 canberra_geiger-mueller_end_window_detectors.pdf	⋮
📎 geiger-meuller-tube_LND.pdf	⋮
📎 philips-gm-18503-datasheet.pdf	⋮
📎 Isotope-Generator-Brochure.pdf	⋮

☰ FYS4505 24H > Moduler

2024 HØST

Hjem
Zoom
Kunngjøringer
Oppgaver
Panopto Video
Moduler
Diskusjoner
Vurderinger
Personer
Sider
Filer
Ally Course
Accessibility Report
Pensum
Quizer
Emneoversikt
Læringsmål
Vurderingsveiledninger
Emneanalyse
Innstillinger

Examples last years

Kollaps alle

Vis fremdrift

▼ Plan, Syllabus, Compendium	⋮
📎 2024_Plan_180924.pdf	⋮
📎 Syllabus.pdf	⋮
📎 Leo_3rd_edition.pdf	⋮
📎 Knoll_3rd_edition.pdf	⋮
📎 2024_Informative_slides.pdf	⋮
📎 fys4505_appetizer.pdf	⋮

▼ Lectures	Lecture slides	⋮
📎 Lecture1_Nuclear_processes_sources_updated.pdf		⋮
📎 Lecture2_Interaction_of_radiation_with_matter-I_updated.pdf		⋮
📎 Lecture3_Interaction_of_radiation_with_matter-II_updated.pdf		⋮
🔗 kahoot link		
📎 Lecture4_General_Detector_Characteristics_updated.pdf		⋮
📎 ionization_detectors.pdf		⋮

Links from Timeplan to Canvas

Example for H2024

Dato	Tid	Aktivitet	Sted	Foreleser	Ressurser/pensum
fr. 23. aug.	12:15–15:00	Nuclear processes, sources	FY, Seminarrom Q397	E. Sahin	Course book Leo: Chapter 1 except 1.11.2, 1.11.3
fr. 30. aug.	12:15–15:00	Interaction of radiation with matter -II	FY, Seminarrom Q397	E. Sahin	Chapter 2.1, 2.2, 2.3, 2.4, 2.7, 2.8
fr. 6. sep.	12:15–15:00	Ionisation detectors -I	FY, Seminarrom Q397	T. S. Tveter	Ionisation_detectors_fredag_6.september_2024 Chapter 6 except 6.9
fr. 13. sep.	12:15–15:00	Statistics and error analysis	FY, Seminarrom Q397	A. L. Read	▪ Statistics and errors - fredag 13. september 2024 at 12:15 ▪ Statistics and errors - fredag 13. september 2024 at 13:15 Skjul mer...
fr. 20. sep.	12:15–17:30	NB! New room: KB, Botanisk kurssal 1260. Experiment-I: Geiger Muller Counter Cha-		▪ A. L. Read ▪ E. Sahin	Chapter 4.1-4.8 Lecture notes (part 1 only, w/answ- swers)

Lecture recordings

Reading (!)

Lecture slides

Calendar

List

Teaching

Timeplan for FYS4505 at present

☐ Show past weeks

Week: All ▼

Tools

Week 34: 2026

Date	Time	Activity	Room	Teaching staff	Syllabus
Mo 17.08.26	08:15-10:00	Forelesning Informative slides	FY Sem 0434	E. Sahin	Informative slides
Fr 21.08.26	12:15-16:00	Gruppetime Nuclear processes sources	FY Sem 0397	E. Sahin	Lecture notes Chapter 1 except 1.11.2, 1.11.3

Week 35: 2026

Date	Time	Activity	Room	Teaching staff	Syllabus
Mo 24.08.26	08:15-10:00	Forelesning Interaction of radiation with matter-I	FY Sem 0434	E. Sahin	Chapter 2.1, 2.2, 2.3, 2.4, 2.7, 2.8
Fr 28.08.26	12:15-16:00	Gruppetime Interaction of radiation with matter -II	FY Sem 0397	E. Sahin	Chapter 2.1, 2.2, 2.3, 2.4, 2.7, 2.8

Week 36: 2026

Date	Time	Activity	Room	Teaching staff	Syllabus
Mo 31.08.26	08:15-10:00	Forelesning Counting statistics and error analysis-I	FY Sem 0434	A.L. Read	Chapter 4.1-4.8
Fr 04.09.26	12:15-16:00	Gruppetime Counting statistics and error analysis-II	FY Sem 0397	A.L. Read	Chapter 4.1-4.8

Week 37: 2026

Date	Time	Activity	Room	Teaching staff	Syllabus
Mo 07.09.26	08:15-10:00	Forelesning	FY Sem 0434	E. Sahin	Chapter 5 except 5.7.1

Tentative teaching plan is given below. It will be uploaded on Canvas and updated when there are changes during the course period.

Timeplan FYS4505/FYS9505					
17/08/2026	Monday	LECTURE Ø434	ALL	Introduction	
21/08/2026	Friday	LECTURE Ø397	Eda	Nuclear processes, sources	Chapter 1 except 1.11.2, 1.11.3
24/08/2026	Monday	LECTURE Ø434	Eda	Interaction of radiation with matter -I	Chapter 2.1, 2.2, 2.3, 2.4, 2.7, 2.8
28/08/2026	Friday	LECTURE Ø397	Eda	Interaction of radiation with matter -II	Chapter 2.1, 2.2, 2.3, 2.4, 2.7, 2.8
31/08/2026	Monday	LECTURE Ø434	Alex	Counting statistics and error analysis-I	Chapter 4.1-4.8
04/09/2026	Friday	LECTURE Ø397	Alex	Counting statistics and error analysis-II	Chapter 4.1-4.8
07/09/2026	Monday	LECTURE Ø434	Eda	Detector characteristics	Chapter 5 except 5.7.1
11/09/2026	Friday	LECTURE Ø397	Trine	Ionisation detectors -I	Chapter 6 except 6.9
14/09/2026	Monday	LECTURE Ø434	Trine	Ionisation detectors -II	Chapter 6 except 6.9
18/09/2026	Friday	LAB. SESSION VK37 (Physics)	Vaitan, Max, A, T	Experiment-I: Geiger Muller Counter Characteristics	
21/09/2026	Monday	LECTURE Ø434	Eda	Scintillation Detectors	Chapters 7, 8.1, 8.2, 8.5, 8.6, 8.7 except 7.4 and 7.5, (8.8, 8.9 and 9.7 are optional)
25/09/2026	Friday	LECTURE Ø397	Eda	Semiconductor detectors-I (Germanium)	Chapter 10.1, 10.2, 10.3, 10.4, 10.5.2, 10.5.4, 10.7.2, 10.7.3, 10.9
28/09/2026	Monday	LECTURE Ø434	Eda	Pulse signal processing	Chapters 11.1, 11.2, 11.3, 14.1, 14.2, 14.3.1, 14.3.2, 14.9, 14.10, 14.11, 14.12, 15.1, 15.2, 15.3
02/10/2026	Friday	Group teaching Ø397	Alex, Vaitan, Max	Counting statistics and error analysis-III	
05/10/2026	Monday	LECTURE Ø434	Trine	Semiconductor detectors-II (Silicon)	Chapter 10.1, 10.2, 10.3, 10.4, 10.5.2, 10.5.4, 10.7.2, 10.7.3, 10.9
09/10/2026	Friday	LAB. SESSION VK33 (Chemistry)	Vaitan, Max, Eda	ExperimentII-III : NaI detector Characteristics - HPGe Detector Characteristics	
12/10/2026	Monday	no class midterm week			
16/10/2026	Friday	no class midterm week			
19/10/2026	Monday	LECTURE Ø434	Eda	Gamma, particle, electron spectroscopy	Lecture notes
23/10/2026	Friday	Group teaching Ø397	Vaitan, Max	Group activities on the course content	
26/10/2026	Monday	LECTURE ikke Ø434	Trine	Modern Detection Systems and Examples in HEP	Lecture notes
30/10/2026	Friday	LAB. SESSION VK37 (Physics)	Vaitan,Max, A,T	Experiment-IV: Compton Scattering	
02/11/2026	Monday	LECTURE ikke Ø434	Kyrre	GEANT4-Simulations	
06/11/2026	Friday	Hands-on Ø397	Kyrre	GEANT4 simulations (hands-on session)	
09/11/2026	Monday	LECTURE ikke Ø434	Alex	Modern Detection Systems and Examples in HEP	Lecture notes
13/11/2026	Friday	Presentations Ø397	Vaitan, Max, A, E, T	Presentations for Compton scattering experiment	
16/11/2026	Monday	Group teaching ikke Ø434	A,E,T, M,V	Reviewing the Course content	
20/11/2026	Friday	Ø397	ALL	Q/A session	
Final exams will be done in the last week of November and/or first week of December (To be decided)					

Tentative teaching plan is given below. It will be uploaded on Canvas and updated when there are changes during the course period.

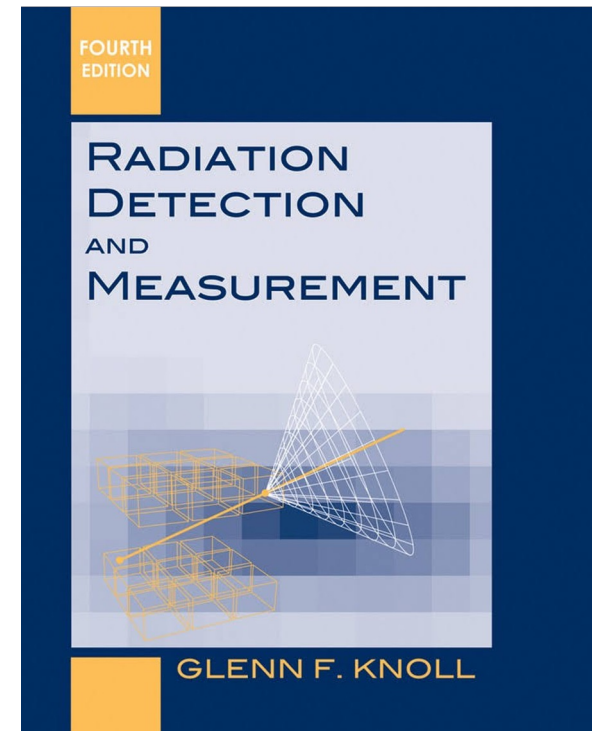
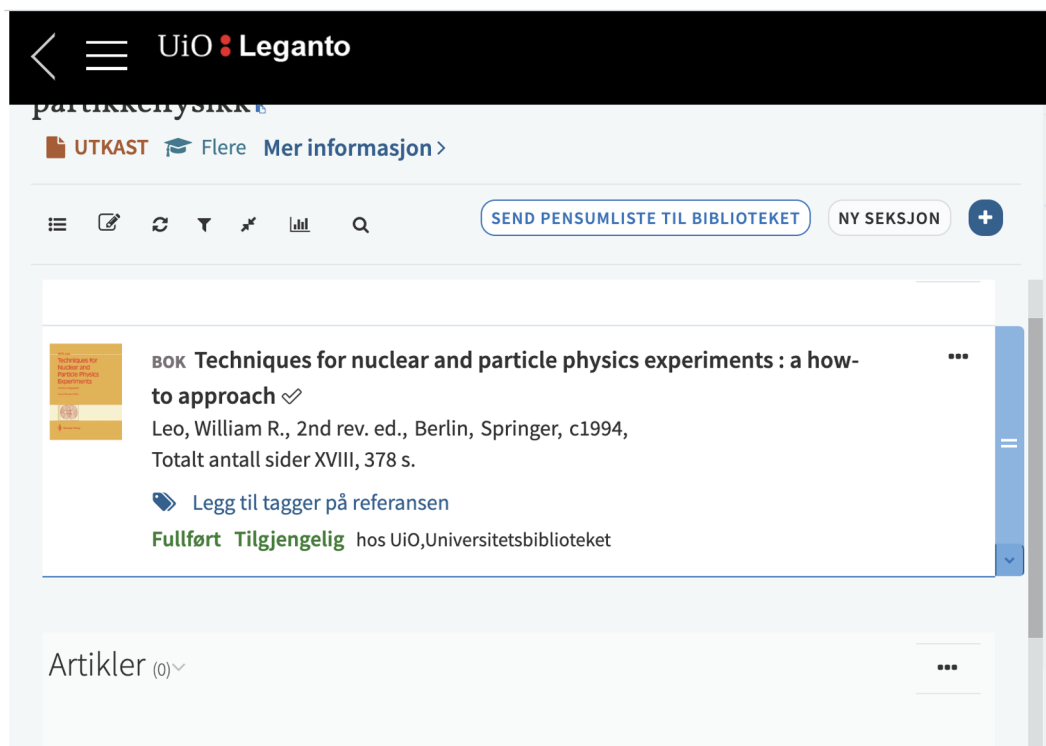
Timeplan FYS-KJM3506/4506					
17/08/2026	Monday	LECTURE Ø434	ALL	Introduction	
19/09/2026	Wednesday	Group teaching V203	AC,H,S,W	About coding report writing	
21/08/2026	Friday	LECTURE Ø397	Eda	Nuclear processes, sources	Chapter 1 except 1.11.2, 1.11.3
24/08/2026	Monday	LECTURE Ø434	Eda	Interaction of radiation with matter -I	Chapter 2.1, 2.2, 2.3, 2.4, 2.7, 2.8
26/08/2026	Wednesday	Group teaching V203	AC,H,S,W	About coding report writing	
28/08/2026	Friday	LECTURE Ø397	Eda	Interaction of radiation with matter -II	Chapter 2.1, 2.2, 2.3, 2.4, 2.7, 2.8
31/08/2026	Monday	LECTURE Ø434	Alex	Counting statistics and error analysis-I	Chapter 4.1-4.8
02/09/2026	Wednesday	Group teaching V203	AC,H,S,W	About coding report writing	
04/09/2026	Friday	LECTURE Ø397	Alex	Counting statistics and error analysis-II	Chapter 4.1-4.8
07/09/2026	Monday	LECTURE Ø434	Eda	Detector characteristics	Chapter 5 except 5.7.1
09/09/2026	Wednesday	Group teaching V203	AC,H,S,W	About counting statistics	
11/09/2026	Friday	LECTURE Ø397	Trine	Ionisation detectors -II	Chapter 6 except 6.9
14/09/2026	Monday	LECTURE Ø434	Trine	Ionisation detectors -II	Chapter 6 except 6.9
15/09/2026	Tuesday	LAB. SESSION VK37 (Physics)	AC,S,H,W	Experiment-I: Geiger Muller Counter Characteristics	
16/09/2026	Wednesday	LAB. SESSION VK37 (Physics)	AC,S,H,W		
17/09/2026	Thursday	LAB. SESSION VK37 (Physics)	AC,S,H,W		
21/09/2026	Monday	LECTURE Ø434	Eda	Scintillation Detectors	Chapters 7, 8.1, 8.2, 8.5, 8.6, 8.7 except 7.4 and 7.5, (8.8, 8.9 and 9.7 are optional)
23/09/2026	Wednesday	Group teaching V203	AC,H,S,W	Data Analysis	
25/09/2026	Friday	LECTURE Ø397	Eda	Semiconductor detectors-I (Germanium)	Chapter 10.1, 10.2, 10.3, 10.4, 10.5.2, 10.5.4, 10.7.2, 10.7.3, 10.9
28/09/2026	Monday	LECTURE Ø434	Eda	Pulse signal processing	Chapters 11.1, 11.2, 11.3, 14.1, 14.2, 14.3.1, 14.3.2, 14.9, 14.10, 14.11, 14.12, 15.1, 15.2, 15.3
29/09/2026	Tuesday	LAB. SESSION VK33 (Chemistry)	AC,S,H,W	ExperimentII-III : NaI detector Characteristics - HPGe Detector Characteristics	
30/09/2026	Wednesday	LAB. SESSION VK33 (Chemistry)	AC,S,H,W		
01/10/2026	Thursday	LAB. SESSION VK33 (Chemistry)	AC,S,H,W		
05/10/2026	Monday	LECTURE Ø434	Trine	Semiconductor detectors-II (Silicon)	Chapter 10.1, 10.2, 10.3, 10.4, 10.5.2, 10.5.4, 10.7.2, 10.7.3, 10.9
23/09/2026	Wednesday	Group teaching V203	AC,H,S,W	Data Analysis	
12/10/2026	Monday	no class midterm week			
16/10/2026	Friday	no class midterm week			
19/10/2026	Monday	LECTURE Ø434	Eda	Gamma, particle, electron spectroscopy	Lecture notes
20/10/2026	Tuesday	LAB. SESSION VK33 (Chemistry)	AC,S,H,W	Experiment-IV: PIPS Detectors and particle spectroscopy	
21/10/2026	Wednesday	LAB. SESSION VK33 (Chemistry)	AC,S,H,W		
22/10/2026	Thursday	LAB. SESSION VK33 (Chemistry)	AC,S,H,W		
26/10/2026	Monday	LECTURE Ø434	Liv?	Neutrons for analytical applications	Lecture notes
28/10/2026	Wednesday	Group teaching V203	AC,H,S,W	Interspec	
02/11/2026	Monday	LECTURE Ø434	Vete	Radiation Protection and safety	Lecture notes
03/11/2026	Tuesday	LAB. SESSION VK33 (Chemistry)	AC,S,H,W	Experiment-V: Quantitative-Qualitative analysis using neutrons	
04/11/2026	Wednesday	LAB. SESSION VK33 (Chemistry)	AC,S,H,W		
05/11/2026	Thursday	LAB. SESSION VK33 (Chemistry)	AC,S,H,W		
09/11/2026	Monday	LECTURE Ø434	All	Course content overview	Lecture notes
11/09/2026	Wednesday	Group teaching V203	AC,H,S,W		
16/11/2026	Monday	LECTURE Ø434	ALL	Q/A session	Lecture notes
20/11/2026	Friday	V203/V226	ALL	Spare	
Final exams will be done in the last week of November (23-27 November 2026)					

Lectures, pensum

Lectures will be given in power point presentations and will be uploaded prior to each lecture.

Pensum:

Additional information from the second book will be given in pdf (on canvas) for some subjects only.



Syllabus

Syllabus has been uploaded to Canvas/Modules and added to the “Syllabus” section on Canvas Navigator

It is also indicated in the Course Timeplan web page and the Teaching plans shown in the previous slides.

Recording lectures

We are positive to record all lectures and publish them on CANVAS or Course page

What is your opinion?

First experiment will start from 18 September Friday.

Experiments

Timeplan FYS4505/FYS9505					
17/08/2026	Monday	LECTURE	Ø434	ALL	Introduction
21/08/2026	Friday	LECTURE	Ø397	Eda	Nuclear processes, sources
24/08/2026	Monday	LECTURE	Ø434	Eda	Interaction of radiation with matter -I
28/08/2026	Friday	LECTURE	Ø397	Eda	Interaction of radiation with matter -II
Experiments		LECTURE	Ø434	Alex	Counting statistics and error analysis-I
		LECTURE	Ø397	Alex	Counting statistics and error analysis-II
		LECTURE	Ø434	Eda	Detector characteristics
	11/09/2026	Friday	LECTURE	Ø397	Trine
14/09/2026	Monday	LECTURE	Ø434	Trine	Ionisation detectors -II
18/09/2026	Friday	LAB. SESSION VK37 (Physics)		Vaitan, Max, A, T	Experiment-I: Geiger Muller Counter Characteristics
21/09/2026	Monday	LECTURE	Ø434	Eda	Scintillation Detectors
25/09/2026	Friday	LECTURE	Ø397	Eda	Semiconductor detectors-I (Germanium)
28/09/2026	Monday	LECTURE	Ø434	Eda	Pulse signal processing
02/10/2026	Friday	Group teaching Ø397		Alex, Vaitan, Max	Counting statistics and error analysis-III
05/10/2026	Monday	LECTURE	Ø434	Trine	Semiconductor detectors-II (Silicon)
09/10/2026	Friday	LAB. SESSION VK33 (Chemistry)		Vaitan, Max, Eda	ExperimentII-III : NaI detector Characteristics - HPGe Detector Characteristics
12/10/2026	Monday	no class midterm week			
16/10/2026	Friday	no class midterm week			
19/10/2026	Monday	LECTURE	Ø434	Eda	Gamma, particle, electron spectroscopy
23/10/2026	Friday	Group teaching Ø397		Vaitan, Max	Group activities on the course content
26/10/2026	Monday	LECTURE	ikke Ø434	Trine	Modern Detection Systems and Examples in HEP
30/10/2026	Friday	LAB. SESSION VK37 (Physics)		Vaitan,Max, A,T	Experiment-IV: Compton Scattering
02/11/2026	Monday	LECTURE	ikke Ø434	Kyrre	GEANT4-Simulations
06/11/2026	Friday	Hands-on Ø397		Kyrre	GEANT4 simulations (hands-on session)
09/11/2026	Monday	LECTURE	ikke Ø434	Alex	Modern Detection Systems and Examples in HEP
13/11/2026	Friday	Presentations Ø397		Vaitan, Max, A, E, T	Presentations for Compton scattering experiment
16/11/2026	Monday	Group teaching ikke Ø434		A,E,T, M,V	Reviewing the Course content
20/11/2026	Friday	Ø397		ALL	Q/A session
Final exams will be done in the last week of November and/or first week of December (To be decided)					

First experiment will start from 15 September Tuesday.

Timeplan FYS-KJM3506/4506

17/08/2026	Monday	LECTURE	Ø434	ALL	Introduction
19/09/2026	Wednesday	Group teaching V203		AC,H,S,W	About coding report writing
21/08/2026	Friday	LECTURE	Ø397	Eda	Nuclear processes, sources
24/08/2026	Monday	LECTURE	Ø434	Eda	Interaction of radiation with matter -I
26/08/2026	Wednesday	Group teaching V203		AC,H,S,W	About coding report writing
28/08/2026	Friday	LECTURE	Ø397	Eda	Interaction of radiation with matter -II
31/08/2026	Monday	LECTURE	Ø434	Alex	Counting statistics and error analysis-I
02/09/2026	Wednesday	Group teaching V203		AC,H,S,W	About coding report writing
			Ø397	Alex	Counting statistics and error analysis-II
			Ø434	Eda	Detector characteristics
		Group teaching V203		AC,H,S,W	About counting statistics
			Ø397	Trine	Ionisation detectors -II
14/09/2026	Monday	LECTURE	Ø434	Trine	Ionisation detectors -II
15/09/2026	Tuesday	LAB. SESSION VK37 (Physics)		AC,S,H,W	Experiment-I: Geiger Muller Counter Characteristics
16/09/2026	Wednesday	LAB. SESSION VK37 (Physics)		AC,S,H,W	
17/09/2026	Thursday	LAB. SESSION VK37 (Physics)		AC,S,H,W	
21/09/2026	Monday	LECTURE	Ø434	Eda	Scintillation Detectors
23/09/2026	Wednesday	Group teaching V203		AC,H,S,W	Data Analysis
25/09/2026	Friday	LECTURE	Ø397	Eda	Semiconductor detectors-I (Germanium)
28/09/2026	Monday	LECTURE	Ø434	Eda	Pulse signal processing
29/09/2026	Tuesday	LAB. SESSION VK33 (Chemistry)		AC,S,H,W	ExperimentII-III : NaI detector Characteristics - HPGe Detector Characteristics
30/09/2026	Wednesday	LAB. SESSION VK33 (Chemistry)		AC,S,H,W	
01/10/2026	Thursday	LAB. SESSION VK33 (Chemistry)		AC,S,H,W	
05/10/2026	Monday	LECTURE	Ø434	Trine	Semiconductor detectors-II (Silicon)
23/09/2026	Wednesday	Group teaching V203		AC,H,S,W	Data Analysis
12/10/2026	Monday	no class midterm week			
16/10/2026	Friday	no class midterm week			
19/10/2026	Monday	LECTURE	Ø434	Eda	Gamma, particle, electron spectroscopy
20/10/2026	Tuesday	LAB. SESSION VK33 (Chemistry)		AC,S,H,W	Experiment-IV: PIPS Detectors and particle spectroscopy
21/10/2026	Wednesday	LAB. SESSION VK33 (Chemistry)		AC,S,H,W	
22/10/2026	Thursday	LAB. SESSION VK33 (Chemistry)		AC,S,H,W	
26/10/2026	Monday	LECTURE	Ø434	Liv?	Neutrons for analytical applications
28/10/2026	Wednesday	Group teaching V203		AC,H,S,W	Interspec
02/11/2026	Monday	LECTURE	Ø434	Vette	Radiation Protection and safety
03/11/2026	Tuesday	LAB. SESSION VK33 (Chemistry)		AC,S,H,W	Experiment-V: Quantitative-Qualitative analysis using neutrons
04/11/2026	Wednesday	LAB. SESSION VK33 (Chemistry)		AC,S,H,W	
05/11/2026	Thursday	LAB. SESSION VK33 (Chemistry)		AC,S,H,W	
09/11/2026	Monday	LECTURE	Ø434	All	Course content overview
11/09/2026	Wednesday	Group teaching V203		AC,H,S,W	
16/11/2026	Monday	LECTURE	Ø434	ALL	Q/A session
20/11/2026	Friday	V203/V226		ALL	Spare

Final exams will be done in the last week of November (23-27 November 2026)

Experiments



FYS4505/FYS9505

Experiments and Reports:

Experiment I: Geiger-Muller Counter (Written report)

Experiment II&III: NaI(Tl) and HpGe detectors (Written report)

Experiment IV: Compton scattering (Presentations)

- Lab guide for each experiment will be uploaded prior to the corresponding lab session.
Remember to go through the guide in advance.
- Written Reports will be submitted in Canvas within **2 weeks** from the experiment.
- Presentations for Experiment III will be given in groups and after 2 weeks from the experiment
- Details on the format of reports will be discussed in detail before the experiments start.

FYS3506/FYS4506

Experiments and Reports:

Experiment I: Geiger-Muller Counter (Written report)

Experiment II&III: NaI(Tl) and HpGe detectors (Written report)

Experiment IV: PIPS Particle spectroscopy (Written or presentations?)

Experiment V: Quantitative- Qualitative analysis using neutrons (Presentations)

- Lab guide for each experiment will be uploaded prior to the corresponding lab session.
Remember to go through the guide in advance.
- Written Reports will be submitted in Canvas within **2-3 weeks** from the experiment.
- Presentations for Experiment V will be given in the exam as a brief opening presentation for 4-5 minutes.
- Details on the format of reports will be discussed in detail before the experiments start.

Reports:

- o Template will be uploaded on Canvas – Latex. Word format is not accepted.
- o Mention:
 - Whether AI is used and state explicitly how.
 - Contribution of each group member
- o Do not exceed 2000 words for your report. If happens, your report will not be accepted. Number of figures tables are not restricted.
- o Submissions will be done in groups on Canvas. We will generate the submission plan prior to each report period.

Geant4 Week:

Timeplan FYS4505/FYS9505					
17/08/2026	Monday	LECTURE	Ø434	ALL	Introduction
21/08/2026	Friday	LECTURE	Ø397	Eda	Nuclear processes, sources
24/08/2026	Monday	LECTURE	Ø434	Eda	Interaction of radiation with matter -I
28/08/2026	Friday	LECTURE	Ø397	Eda	Interaction of radiation with matter -II
31/08/2026	Monday	LECTURE	Ø434	Alex	Counting statistics and error analysis-I
04/09/2026	Friday	LECTURE	Ø397	Alex	Counting statistics and error analysis-II
07/09/2026	Monday	LECTURE	Ø434	Eda	Detector characteristics
11/09/2026	Friday	LECTURE	Ø397	Trine	Ionisation detectors -I
14/09/2026	Monday	LECTURE	Ø434	Trine	Ionisation detectors -II
18/09/2026	Friday	LAB. SESSION VK37 (Physics)		Vaitan, Max, A, T	Experiment-I: Geiger Muller Counter Characteristics
21/09/2026	Monday	LECTURE	Ø434	Eda	Scintillation Detectors
25/09/2026	Friday	LECTURE	Ø397	Eda	Semiconductor detectors-I (Germanium)
28/09/2026	Monday	LECTURE	Ø434	Eda	Pulse signal processing
02/10/2026	Friday	Group teaching Ø397		Alex, Vaitan, Max	Counting statistics and error analysis-III
05/10/2026	Monday	LECTURE	Ø434	Trine	Semiconductor detectors-II (Silicon)
09/10/2026	Friday	LAB. SESSION VK33 (Chemistry)		Vaitan, Max, Eda	ExperimentII-III : NaI and HPGe Detector Characteristics
12/10/2026	Monday	no class midterm week			
16/10/2026	Friday	no class midterm week			
19/10/2026	Monday	LECTURE	Ø434	Eda	Gamma, partide, electron spectroscopy
23/10/2026	Friday	Group teaching Ø397		Vaitan, Max	Group activities on the course content
26/10/2026	Monday	LECTURE	ikke Ø434	A/T	Modern Detection Systems and Examples in HEP
29/10/2026	Thursday	LAB. SESSION VK37 (Physics)		Vaitan, Max, A, T	Experiment IV: Compton scattering
02/11/2026	Monday	LECTURE	ikke Ø434	Kyrre	GEANT4-Simulations
06/11/2026	Friday	Hands-on Ø397		Kyrre	GEANT4 simulations (hands-on session)
09/11/2026	Monday	LECTURE	ikke Ø434	A/T	Modern Detection Systems and Examples in HEP
13/11/2026	Friday	Presentations Ø397		Vaitan, Max, A, T	Presentations for Compton scattering Experiment
16/11/2026	Monday	Group teaching ikke Ø434		A,E,T, M,V	Reviewing the Course content
20/11/2026	Friday	Ø397		ALL	Q/A session
Final exams will be done in the last week of November and/or first week of December (To be decided)					



Dr. Kyrre Ness Sjøbæk
Lecturer (Geant4 simulations)
High-Energy Physics

- In November
- Lecture plus hands-on lab

Final Exam

Final exam will be in oral format.

23 to 27th November for FYS3506/FYS4506

23-27 November and/or 30Nov-4 December (to be decided) for FYS4505/FYS9505

Final Exam

- Oral exam – 40 minutes
- Questions published well before the end
- Expect you to memorize the main dependences of the Bethe-Bloch energy loss formula and their physics explanation
- Don't be surprised if you have to apply some previous knowledge, e.g., electromagnetic forces on a moving charged particle

More details about the oral exam will be given towards the exam period. Do not worry about it now :)

FYS4505/FYS9505



Learning outcome

After completing the course, you:

- know how different types of ionizing radiation interacts with matter and what processes are important in different energy regimes.
- understand how ionization detectors, semiconductor detectors, and scintillator detectors work and how they are used alone and in multi-detector systems.
- have learned how data is read out and will have knowledge of electronics for modern detectors, including e.g. triggering and signal control and coincidences.
- are able to use computer simulations to understand what is happening in a detection system, study detector response, and signal background.
- can apply statistical methods and computational tools in the interpretation of results from measurements and have sufficient knowledge about measurement techniques to assess detector usage in different situations.
- have knowledge of gamma spectroscopy, particle spectroscopy, and electron spectroscopy for low energy applications.
- have knowledge of the structure of modern high energy experiments and their particular challenges (event selection, event reconstruction, simulations, and data analysis), with ATLAS and ALICE at CERN as examples.

FYS3506/FYS4506



Learning outcome

After completing the course, you are able to:

- describe radiation sources commonly used in nuclear experiments and measurements.
- explain how different types of ionizing radiation interact with matter and which processes are important at different energies.
- explain the functioning of ionization, semiconductor, and scintillator detectors, and be able to set them up and use them in simple counting setups for spectroscopy, for both particles and electromagnetic radiation.
- utilize electronics and software for processing signals from detectors and data acquisition.
- apply statistical methods and uncertainty propagation for nuclear measurements.
- explain how a neutron generator operates and have experience with neutron activation.
- recite the fundamental principles of radiation protection and conduct risk assessments for working with radioactivity.

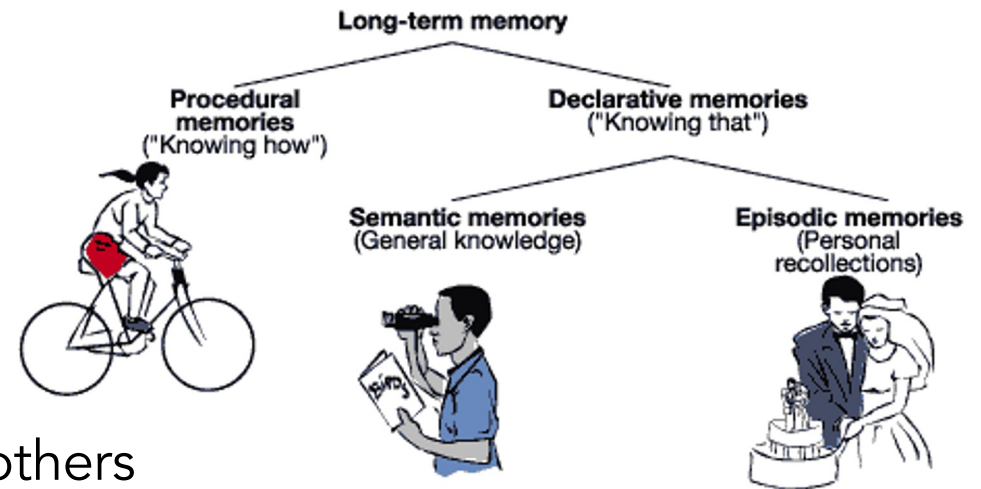
What do we expect from you?

- o ask questions during the lectures (there are no stupid questions but answers 😊)
- o interact with each other (Discussions Canvas, messenger etc.)
- o interact with us (Discussions Canvas, emails, office visits)
- o continuous feedback to us (in the class, after the class, in the labs, Discussions Canvas, email)
- o What is the best way for you guys to learn?

Memory systems and how we learn

Most people learn

- 10 %** of what they read
- 20 %** of what they hear
- 30 %** of what they see
- 50 %** of what they see and hear
- 70 %** of what they talk over with others
- 80 %** of what they use and do in real life
- 95 %** of what they teach someone else



Source. Attributed to William Glasser; quoted by *Association for Supervision and Curriculum development Guide 1988*

Aktuelt

- Aktuelle saker

- Arrangementser

Suksess med åpne diskusjonsoppgaver

Studentene i kjernefysikk tar grep om egen læring.



Masterstudent Wanja Paulsen og stipendiat Dorteia Gjestvang håper at andre studenter vil oppdage glede ved å bruke diskusjonsoppgaver som

Success with open discussion tasks

The students in nuclear physics take control of their own learning.

kunnskapshull.

For at studentene skal lære å bruke faget i diskusjoner, må undervisere legge til rette for at studentene selv får snakke sammen.

Både læringsutbyttebeskrivelsene og de konkrete læringsmålene i emnene er gode utgangspunkt for diskusjonsoppgaver.

Snakk med studentene

<https://www.mn.uio.no/kurt/aktuelt/aktuelle-saker/suksess-med-åpne-diskusjonsoppgaver.html>

What do you expect from us?

What is this course about?

Particles -Origin

Interaction with Medium

Detectors (Medium)

Signal processing

Getting useful information

Designing your own
experiment



FYS4505/9505

We are here:



Ideas:
Nuclear structure
Nuclear
Astrophysics
Particle physics
Theory

Instrumentation:
Outcoming
particles/nuclei
Which type of detectors
Electronics & DAQ

Results

Instrumentation is extremely important.



Please remember:

- **You should have fun while learning during the course.**
- **Let us know when you stop having fun!**