Study templates for MATRES students starting during fall 2025

Contents

General information

Please note that the study templates presented here are to help you in choosing courses and are only suggestions. If you would like to prepare your own plan, please contact the academic mentor of your study track and discuss your plans with them. The academic mentors for each study track can be found below:

- Computational materials physics: Antti Kuronen (antti.kuronen@helsinki.fi)
- Electronics and industrial physics: Ari Salmi (ari.salmi@helsinki.fi)
- Experimental materials physics: Filip Tuomisto (filip.tuomisto@helsinki.fi)
- Inorganic materials chemistry: Matti Putkonen (matti.putkonen@helsinki.fi)
- Medical physics and biophysics: Antti Kuronen (antti.kuronen@helsinki.fi)
- Polymer materials chemistry: Robert Luxenhofer (robert.luxenhofer@helsinki.fi)

When preparing your own plans remember to take the following things into consideration:

- You should complete 60 credits / academic year which is approximately 15 cr / period. The entire degree lasts two academic years and is 120 credits.
- All study tracks have common mandatory courses which should always be taken (MATR301 Introductory Course to Materials Research in period I and MATR302 Materials Characterization in period II).
- Each study track usually also has compulsory studies which should always be prioritized when choosing courses.
- Finnish studies are highly recommended for international students and can be included in your degree (in Other studies).

You can search for courses taught in a certain period by going to https://studies.helsinki.fi/courses. You can search for courses by their code or filter by using the degree programme. Some useful filters are:

- Degree programme (you can also search using the corresponding course codes for each degree programme which are given in brackets):
    - Chemistry teaching can be found in the following programmes
        - Master's Programme in Materials Research (MATRXXX)
        - Master's Programme in Chemistry and Molecular Sciences (KEMXXX)
        - Master's Programme in Atmospheric sciences (ATMXXX)
    - Physics teaching can be found in the following programmes
        - Master's Programme in Materials Research (MATRXXX)
        - Master's Programme in Particle Physics and Astrophysical Sciences (PAPXXX)

        - Master’s Programme in Theoretical and Computational methods (TCMXXX)
        - Master’s Programme in Atmospheric sciences (ATMXXX)
- Time
    - Allows you to choose a period to see all the teaching given in this period. Please note that this also includes exams unless the completion methods are used as a filter.

Computational materials physics

Period I		Credits
MATR301	Introductory Course to Materials Research	5
MATR306	Materials physics	5
	Choose one to two according to interest	
PAP334	Statistical Methods	2,5 (50 % of 5 cr)
DATA11002	Introduction to Machine Learning	5
XXXNNN	A course from other programmes or from MATRES	5

Period II		
MATR302	Materials characterization	5
MATR325	Molecular dynamics simulations	5
MATR305	Nanophysics and nanochemistry	5
PAP334	Statistical Methods (if chosen in the previous period)	2,5 (50 % of 5 cr)

Period III		
MATR3031	Solid state physics: crystal structure and atomic dynamics	5
MATR323	Basics of Monte Carlo simulations	5
MATR3082	Physics of thin films and heterostructures	5

Period IV		
MATR3032	Solid state physics: electronic structure and properties	5
MATR326	Tools for high performance computing	5
MATR324	Monte Carlo simulations in physics	5
	Total credits	60

Electronics and industrial physics

Period I		Credits
MATR301	Introductory Course to Materials Research	5
MATR306	Materials physics	5
MATR310	Laboratory Exercises (5 cr in this period)	5 (50% of 10 cr)
Period II		
MATR302	Materials characterization	5
MATR310	Laboratory Exercises (5 cr in this period)	5 (50% of 10 cr)
XXXNNN	A course from other programmes or from MATRES	5
Period III		
MATR335	Electronics II	5 (50% of 10 cr)
MATR320	Nano Acoustics I	5
XXXNNN	A course from other programmes or from MATRES	5
Period IV		
MATR335	Electronics II	5 (50% of 10 cr)
MATR321	Nano Acoustics II	5
XXXNNN	A course from other programmes or from MATRES	5
	Total credits	60

Experimental materials physics

Period I		Credits
MATR301	Introductory Course to Materials Research	5
MATR306	Materials physics	5
XXXNNN	A course from other programmes or from MATRES	5
Period II		
MATR302	Materials characterization	5
MATR308	Surface Physics	5
	Choose one according to interest	
MATR310	Laboratory Exercises (5 cr in this period)	5 (50% of 10 cr)
XXXNNN	A course from other programmes or from MATRES	5
Period III		
MATR3031	Solid state physics: crystal structure and atomic dynamics	5
MATR3082	Physics of thin films and heterostructures	5
	Choose one to two according to interest	
MATR386	Physics of positrons in solids and defects (2,5 cr in this period)	2,5 (50 % of 5 cr)
MATR311	Synchrotron light in materials science	5
MATR310	Laboratory Exercises (2,5 cr if you also chose MATR386 or MATR311, otherwise 5 cr)	2,5-5 (25-50% of 10 cr)
Period IV		
MATR3032	Solid state physics: electronic structure and properties	5
	Choose two to three according to interest	
MATR386	Physics of positrons in solids and defects (2,5 cr in this period)	2,5 (50 % of 5 cr)
MATR310	Laboratory Exercises (2,5 cr if you also chose MATR386 or MATR311, otherwise 5 cr)	2,5-5 (25-50% of 10 cr)
MATR341	Surface Chemistry	5
	Total credits	60

Inorganic materials chemistry

Period I		Credits
MATR301	Introductory Course to Materials Research	5
MATR361	Thin films	5 (50 % of 10 cr)
	Choose one according to interest	
KEM354	Organometallic chemistry	5
MATR306	Materials physics	5
MATR381	Electrochemistry in materials science	5
KEM411	Chemicals and legislation (online)	5

Period II		
MATR302	Materials characterization	5
MATR361	Thin films	5 (50 % of 10 cr)
	Choose one according to interest	
MATR305	Nanophysics and nanochemistry	5
MATR362	Workshop on X-ray diffraction and thermoanalytical	5
KEM411	Chemicals and legislation (online)	5

Period III		
	Choose three according to interest	
MATR311	Synchrotron light in materials science	5
MATR373	Atomic layer deposition and etching	5
KEM363	Structural methods in inorganic chemistry	5
KEM411	Chemicals and legislation (online)	5
XXXNNN	A course from other programmes or from MATRES	5

Period IV		
MATR359	Solid state chemistry	5
	Choose two according to interest	
MATR341	Surface chemistry	5
KEM411	Chemicals and legislation (online)	5
XXXNNN	A course from other programmes or from MATRES	5
	Total credits	60

Medical physics and biophysics

Biophysics focus

Period I		Credits
MATR301	Introductory Course to Materials Research	5
MATR331	Introduction to Biological Physics	5
PAP334	Statistical Methods	2,5 (50 % of 5 cr)
Period II		
MATR302	Materials characterization	5
MATR333	Modeling of Biological Systems	5
GMB-105	Introduction to Structural Biology and Biophysics	5
PAP334	Statistical Methods	2,5 (50 % of 5 cr)
Period III		
MATR332	Physics of Biological Systems	5
MATR323	Basics of Monte Carlo Simulations	5
DATA11002	Introduction to Machine Learning	5
Period IV		
MATR326	Tools for High Performance Computing	5
	Choose two according to interest	
KEM342	Molecular modelling	5
MATR324	Monte Carlo Simulations in Physics (recommended if MATR333 was completed)	5
XXXNNN	A course from other programmes or from MATRES	5
BSPH2012	Statistical Physics (can only be included in Other studies, not Advanced studies)	5
	Total credits	60

Medical physics focus

Period I		Credits
MATR301	Introductory Course to Materials Research	5
MATR315	Radiation Dosimetry	2,5 (50% of 5 cr)
	Choose one to two according to interest	
PAP338	Gaseous radiation detectors and scintillators	5
PAP334	Statistical Methods	2,5 (50 % of 5 cr)
XXXNNN	A course from other programmes or from MATRES	5

Period II		
MATR302	Materials characterization	5
MATR315	Radiation Dosimetry	2,5 (50% of 5 cr)
MATR316	Nuclear Physics	5
	Choose none or one according to interest	
PAP334	Statistical Methods	2,5 (50 % of 5 cr)
XXXNNN	A course from other programmes or from MATRES	5

Period III		
MATR319	Medical Physics	2,5 (50% of 5 cr)
MATR310	Laboratory Exercises (5 cr)	5 (50% of 10 cr)
	Choose one to two according to interest	
PAP339	Semiconductor radiation detectors	5
MATR323	Basics of Monte Carlo simulations	5
XXXNNN	A course from other programmes or from MATRES	5

Period IV		
MATR309	Radiation protection	5
MATR319	Medical Physics	2,5 (50% of 5 cr)
MATR310	Laboratory Exercises (5 cr)	5 (50% of 10 cr)
	Choose none or one according to interest	
MATR326	Tools for high performance computing	5
MATR324	Monte Carlo simulations in physics	5
XXXNNN	A course from other programmes or from MATRES	5
	Total credits	60

Polymer materials chemistry

Research focus

Period I		Credits
MATR301	Introductory Course to Materials Research	5
MATR345	Basics in Polymer Chemistry	5
MATR348	Laboratory Practicum	2,5 (50% of 5 cr)
Period II		
MATR302	Materials characterization	5
MATR346	Polymer physics	5
MATR348	Laboratory Practicum	2,5 (50% of 5 cr)
MATR380	Optional Research Project in Polymer Materials Chemistry	2,5-5 (25-50% of 10 cr)
Period III		
MATR380	Optional Research Project in Polymer Materials Chemistry	2,5-5 (25-50% of 10 cr)
	Choose two to three according to interest	
MATR356	Polymers in Medicine	5
XXXNNN	A course from other programmes or from MATRES	5
Period IV		
MATR380	Optional Research Project in Polymer Materials Chemistry	2,5-5 (25-50% of 10 cr)
MATR347	Polymer Chemistry 2: Advanced synthesis and functional	5
	Choose one to two according to interest	
XXXNNN	A course from other programmes or from MATRES	5
Intensive period in May		
MATR351	Rheology	5
May - October		
MATR351	Research project in Polymer Materials Chemistry (can be started any time e.g. in May to October	15
	Total credits	60

Theory focus

Period I		Credits
MATR301	Introductory Course to Materials Research	5
MATR345	Basics in Polymer Chemistry	5
KEM321	Structure and reactivity - organic reactions	5
Period II		
MATR302	Materials characterization	5
MATR346	Polymer physics	5
MATR348	Laboratory Practicum	5
Period III		
	Choose two to three according to interest	
MATR356	Polymers in Medicine	5
XXXNNN	A course from other programmes or from MATRES	5-10
Period IV		
MATR355	Functional polymers	5
MATR347	Polymer Chemistry 2: Advanced synthesis and functional	5
	Choose up to one according to interest	
XXXNNN	A course from other programmes or from MATRES	5
Intensive period in May		
MATR351	Rheology	5
May - October		
MATR351	Research project in Polymer Materials Chemistry (can be started any time e.g. in May to October	15
	Total credits	60