



## **INTERNATIONAL MASTER´S PROGRAMMES 2013 - 2014**

**MASTER OF ARTS  
MASTER OF PHILOSOPHY  
MASTER OF SCIENCE**

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**For course descriptions see: <http://www.ntnu.edu/studies/courses>**

## **INTRODUCTION**

This is a guide for students who are enrolled in one of the International Master's Degree Programmes at NTNU, and who are in the process of planning or completing their degree. It contains an updated outline of the programmes for each of the individual International Master's Degrees.

As this catalogue is revised annually, only the latest edition is valid. This edition is valid until the end of the academic year 2013/2014.

Good luck with your studies,

Student and Academic Division

## **NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY (NTNU)**

NTNU consists of 7 faculties. The University has over 20 000 students, and approximately 5 000 employees.

Although the University has a main profile in technological and the natural sciences it also has a full range of degrees in the social sciences, arts, humanities, medicine, and psychology. NTNU has a number of non-degree courses, such as those for practising musicians and teachers, as well as for artists in the visual arts.

NTNU is concerned with creativity and innovation. A University where its students can meet the challenges of a new era. NTNU is concerned with interrelations at the macro- and micro-levels, and contributes to developing society that is in harmony with our natural resources in interplay with traditional and new knowledge.

## **GUIDE TO THE INTERNATIONAL MASTER´S PROGRAMMES**

### **Tables**

The tables show the courses in relation to the overall degree programme. Here is a guide to the specific boxes:

### **Ex (Course year and time of examination)**

This box states which course year and examination period this examination can be taken for the first time.

The examination period is marked “h” for the autumn examination and “v” for the spring examination.

### **Subject no.**

The course code comprises 6 or 7 digits.

### **Subject title**

This box gives the course title in abbreviated form.

### **Note**

This box includes any references to footnotes.

### **Cr (credits)**

The credits give the weighting of each course in the degree programme. Credits are given according to the European Credit Transfer System (ECTS).

# FACULTY OF NATURAL SCIENCES AND TECHNOLOGY

## MSC-PROGRAMME IN CHEMICAL ENGINEERING (MSCHEMENG)

Term 1 and 2

Ex	Subject no.	Subject title	Note	Cr	Comp./ Opt.
		<b>Compulsory and optional courses</b>	1		
1h	TKP4140	PROCESS CONTROL		7,5	v1
1h	TKP4155	REACTION KIN/CATALYS		7,5	v1
1h	TKP4160	TRANSPORT PHENOMENA		7,5	v1
1h	TKP4170	PROCESS DESIGN PROJ	2	7,5	v
1v	-	EXP IN TEAM INT PROJ		7,5	o
1v	TKP4115	SURFACE/COLLOID CHEM		7,5	v1
1v	TKP4130	POLYMER CHEMISTRY		7,5	v2
1v	TKP4135	CHEM PROC SYST ENG		7,5	v2
1v	TKP4145	REACTOR TECHNOLOGY		7,5	v2
1v	TKP4150	PETROCH/OIL REFINING		7,5	v2
1v	TKP4171	PROCESS DESIGN PROJ	2	7,5	v
		<b>Supplementary courses</b>	1		
1h	TBT4140	BIOCHEM ENGINEERING		7,5	v
1h	TMA4195	MATHEMATIC MODELLING		7,5	v
1h	TMA4215	NUMERIC MATHEMATICS		7,5	v
1h	TPG4105	PETROLEUM ENG BC		7,5	v
1h	TPG4140	NATURAL GAS		7,5	v
1h	TPK4120	SAFETY/RELIAB ANALYS		7,5	v
1v	KJ2053	CHROMATOGRAPHY		7,5	v
1v	TBT4125	FOOD CHEMISTRY		7,5	v
1v	TBT4130	ENVIRONM BIOTECH		7,5	v
1v	TEP4215	ENERGY AND PROCESS		7,5	v
1v	TEP4250	MULTIPHASE TRANSPORT		7,5	v
1v	TEP4265	FOOD ENGINEERING		7,5	v
1v	TKJ4175	CHEMOMETRICS		7,5	v
1v	TKP4180	BIOENERG FIBER TECH		7,5	v2
1v	TKP4185	NUCLEAR POWER INTRO		7,5	v
1v	TKP4190	FABR/APPL NANOMAT		7,5	v
1v	TKT4140	NUM METH COMP LAB		7,5	v
1v	TMM4175	POLYMERS/COMPOSITES		7,5	v
1v	TPG4230	FIELD DEV/OPERATIONS		7,5	v
1v	TTK4135	OPTIMISATION/CONTROL		7,5	v
1v	TVM4145	WATER/WASTE W TREATM		7,5	v

o - compulsory courses

v - optional courses

v1 - at least 3 of these 4 courses must be selected

v2 - at least 1 of these courses must be selected

Ex 1h = Term 1, Exam Autumn

Ex 1v = Term 2, Exam Spring

- 1) The courses must be selected to obtain a total of 30 credits in each semester. Supplementary courses are not considered when planning the teaching and examination schedules.
- 2) The course must be chosen either in autumn (TKP4170) or in spring (TKP4171).

## FACULTY OF NATURAL SCIENCES AND TECHNOLOGY

### MSC-PROGRAMME IN CHEMICAL ENGINEERING (MSCHEMENG)

Term 3 and 4

Ex	Subject no.	Subject title	Note	Cr
		<b>Specialization courses</b>	1	
2h	TKP4515	CATALYS/PETROCHEM SC		7,5
2h	TKP4525	COLL/POLYMER CHEM SC		7,5
2h	TKP4535	ENVIRONM/REACT TECH SC		7,5
2h	TKP4555	PROCESS SYST ENG SC		7,5
2h	TKP4565	PULP/PAPER BIOREFIN SC		7,5
		<b>Specialization projects</b>	1	
2h	TKP4510	CATALYS/PETROCHEM SP		15,0
2h	TKP4511	CATALYS/PETROCHEM SP		7,5
2h	TKP4520	COLL/POLYMER CHEM SP		15,0
2h	TKP4521	COLL/POLYMER CHEM SP		7,5
2h	TKP4530	ENVIRONM/REACT TECH SP		15,0
2h	TKP4531	ENVIRONM/REACT TECH SP		7,5
2h	TKP4550	PROCESS SYST ENG SP		15,0
2h	TKP4551	PROCESS SYST ENG SP		7,5
2h	TKP4560	PULP/PAPER BIOREFIN SP		15,0
2h	TKP4561	PULP/PAPER BIOREFIN SP		7,5
		<b>Supplementary courses</b>	2	
2h	TBT4140	BIOCHEM ENGINEERING		7,5
2h	TKP4140	PROCESS CONTROL		7,5
2h	TKP4155	REACT KIN/CATALYSIS		7,5
2h	TKP4160	TRANSPORT PHENOMENA		7,5
2h	TMA4195	MATHEMATIC MODELLING		7,5
2h	TMA4215	NUMERIC MATHEMATICS		7,5
2h	TPG4105	PETROLEUM ENG BC		7,5
2h	TPG4140	NATURAL GAS		7,5
2h	TPK4120	SAFETY/RELIAB ANALYS		7,5
2h	TVM4145	WATER/WASTEW TREATM		7,5
		<b>Master Thesis</b>		
2v	TKP4900	CHEM PROCESS TECHN		30,0

Ex 2h = Term 3, Exam Autumn

Ex 2v = Term 4, Master Thesis Spring

- One specialization course and one specialization project must be selected. The specializations are within the following five main profiles:  
Catalysis and Petrochemistry  
Colloid and Polymer Chemistry  
Process Systems Engineering  
Environmental Technology and Reactor Technology  
Pulp & Paper and Biorefinery
- Supplementary courses must be selected to obtain a total of 30 credits per semester. The courses are not considered when planning the teaching and examination schedules.

# FACULTY OF INFORMATION TECHNOLOGY, MATHEMATICS AND ELECTRICAL ENGINEERING

## MSC-PROGRAMME IN ELECTRIC POWER ENGINEERING (MSEPOWER)

Term 1, 2, 3 and 4

Ex	Subject no.	Subject title	Note	Cr	Comp/ Opt.
		<b>Compulsory and optional courses</b>	1		
1h	TET4235	ENERGY MANAGEM BUILD		7,5	v
1h	TET4115	POWER SYST ANALYSIS		7,5	v1
1h	TET4160	INSULATING MATERIALS		7,5	v1
1h	TET4165	LIGHT AND LIGHTING		7,5	v
1h	TET4190	POWER ELECTRONICS RE		7,5	v1
1h	TET5100	POWER ENG UPDATES		7,5	o
1h	TPK4120	SAFETY/REAL ANALYSIS		7,5	v
1v	-	EXP IN TEAM INT PROJ		7,5	o
1v	TET4220	ENERGY/ENV CONSEQUEN	2	7,5	v
1v	TET4120	ELECTR DRIVES		7,5	v2
1v	TET4135	ENERGY PLANNING		7,5	v2
1v	TET4170	EL INSTALLATIONS	2	7,5	v2
1v	TET4175	DES/OPER SMART GRID		7,5	v2
1v	TET4180	EL POW SYST STAB		7,5	v2
1v	TET4185	POWER MARKETS	2	7,5	v2
1v	TET4195	HIGH VOLTAGE EQUIPM		7,5	v2
1v	TET4200	MAR OFFSH POW SYST		7,5	v2
2h	TET4165	LIGHT AND LIGHTING		7,5	v
2h	TET5500	EL POWER ENG SP		15,0	o
2h	TET5505	EL POWER ENG SC		7,5	o
2h	TPK4120	SAFETY/REL ANALYSIS		7,5	v
2h	TPK5100	PROJ PLAN/CONTR		7,5	v
		<b>Master Thesis</b>			
2v	TET4910	ELEC POW ENG		30,0	o

o - compulsory courses

v - optional courses

v1 - at least two of these courses must be chosen

v2 - at least two of these courses must be chosen

Ex 1h = Term 1, Exam Autumn

Ex 1v = Term 2, Exam Spring

Ex 2h = Term 3, Exam Autumn

Ex 2v = Term 4, Master Thesis Spring

- 1) In addition to the compulsory courses, the student must select courses so that the requirement of 60 credits pr year is met. Available courses are listed in the table. Other relevant courses may be accepted after application.
- 2) The course is not considered when planning the teaching and examination schedules.



## FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY

### MSC-PROGRAMME IN GEOTECHNICS AND GEOHAZARDS (MSGEOTECH)

Term 1, 2, 3 and 4

Ex	Subject no.	Subject title	Note	Cr
		<b>Compulsory courses</b>		
1h	TBA4110	GEOTECH FIELD/LAB IN		7,5
1h	TBA4231	APPLIED GEOMATICS		7,5
1h	TBA5100	THEORETICAL SOIL MEC		7,5
1h	TBA5150	GEOHAZARDS/RISK AN		7,5
1v	-	EXP IN TEAM INT PROJ		7,5
1v	TBA4335	HIGHW PLAN/PAVE TECH	1	7,5
1v	TBA5155	FOUNDATIONS/SLOPES		7,5
1v	TGB5110	GEOLOGY TUNNELL BC		7,5
1v	TKT4201	STRUCTURAL DYNAMICS	1	7,5
2h	TBA4116	GEOTECH ENG AC		7,5
2h	TBA4510	GEOTECH ENG SP	2	7,5
2h	TGB5100	ROCK ENGINEERING AC		7,5
2h	-	ELECTIVE COURSE	3	7,5
		<b>Master Thesis</b>		
2v	TBA4900	GEOTECH ENGINEERING		30,0

Ex 1h = Term 1, Exam Autumn

Ex 1v = Term 2, Exam Spring

Ex 2h = Term 3, Exam Autumn

Ex 2v = Term 4, Master Thesis Spring

- 1) One of the courses TBA4335 and TKT4201 must be chosen.
- 2) The primary choice is the combination TBA4510 (7,5 cr) together with an elective course (7,5 cr). In some case, when an appropriate elective course is hard to find, the combination may be exchanged with the 15 cr course TBA4511 Geotechnical Engineering, Specialization Project. This must be done in agreement with the project supervisor.
- 3) A technical or project-related course must be chosen.

## FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY

### MSC-PROGRAMME IN HYDROPOWER DEVELOPMENT (MSB1)

Term 1, 2, 3 and 4

Ex	Subject no.	Subject title	Note	Cr
		<b>Compulsory courses</b>		
1h	TVM4105	HYDROLOGY		7,5
1h	TVM5115	DAM ENGINEERING		7,5
1h	TVM5125	HYDRAULIC DESIGN		7,5
1h	TVM5135	PLANNING HYDROPOWER		7,5
1v	-	EXP IN TEAM INT PROJ		7,5
1v	TGB5110	GEOLOGY TUNNELL BC		7,5
1v	TVM5132	PREF STUDY HYDRO DEV		7,5
1v	TVM5140	ECON ASSESM HYDROPOW		7,5
2h	TGB5100	ROCK ENGINEERING AC		7,5
2h	TVM4106	HYDRO MODELLING		7,5
2h	TVM5160	HEADWORKS/SEDIMENT		7,5
2h	TVM5171	ENV IMP HYDROPOWER		7,5
		<b>Master Thesis</b>	1	
2v	TBA4910	PROJ MANAGEMENT		30,0
2v	TGB4910	ROCK ENGINEERING		30,0
2v	TVM4915	HYDROPOWER DEVELOPMENT		30,0

Ex 1h = Term 1, Exam Autumn

Ex 1v = Term 2, Exam Spring

Ex 2h = Term 3, Exam Autumn

Ex 2v = Term 4, Master Thesis Spring

1) Choose one of the thesis.

# FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY

## MSC-PROGRAMME IN INDUSTRIAL ECOLOGY (MSINDECOL)

Term 1, 2

Term 3 and 4 (2014/15)

Ex	Subject no	Subject title	Note	Cr
		<b>Compulsory courses</b>		
1h	TEP4223	LIFE CYCLE ASSESS		7,5
1h	TEP4275	INDUSTRIAL ECOLOGY		7,5
1h	TEP4285	MATERIAL FLOW ANALYS		7,5
1h	TI04265	STRATEGIC MANAGEMENT		7,5
1v	-	EXP IN TEAM INT PROJ		7,5
1v	S0K1101	ENVIRONM RESOURCE		7,5
		<b>Optional courses</b>	1	
1v	TEP4220	ENERGY/ENV CONSEQUEN	2	7,5
1v	TEP4290	MODEL BUILT ENV SYST		7,5
1v	TI05215	GLOB GOV SUST SUPPLY	3	7,5
1v	TPD5100	SUS PROD DES AC	4	7,5
1v	POL1003	POLITICS ENVIRONMENT	5	7,5
1v	POL3004	RESEARCH DESIGN	5,6	7,5
		<b>Optional courses</b>	1	
2h	TEP4222	INPUT-OUTPUT ANALYS	2	7,5
2h	TI04146	FIN SC/TECHN STUD	6	7,5
2h	TI04195	ENV MANAGEMENT/CG		7,5
2h	TI04201	RISK GOVERNANCE		7,5
2h	TI04525	SAFE HEALTH/ENV SC	3	7,5
2h	TPD4505	DESIGN THEORY SC	4	7,5
2h	TPK4160	VALUE CHAIN CONTR		7,5
2h	POL3507	POLICY ANALYSIS		15,0
2h	SOS1002	RESEARCH METHODS	7	15,0
		<b>Project and thesis preparation courses</b>	8	
2h	TBA4580	IND ECOL PROJECT		15,0
2h	TEP5100	IND ECOL PROJECT		15,0
2h	TI05235	IND ECOL PROJECT		15,0
2h	TPD4190	DESIGN PROJECT		15,0
2h	POL3520	IND ECOL PROJECT		15,0
		<b>Master Thesis</b>	9	
2v	TBA4950	INDUSTRIAL ECOLOGY		30,0
2v	TEP4930	INDUSTRIAL ECOLOGY		30,0
2v	TI04955	INDUSTRIAL ECOLOGY		30,0
2v	TPD4910	INDUSTRIAL ECOLOGY		30,0
2v	POL3920	INDUSTRIAL ECOLOGY		30,0

o = Compulsory courses

v = Optional courses

Ex 1h = Term 1, Exam Autumn

Ex 1v = Term 2, Exam Spring

Ex 2h = Term 3, Exam Autumn

Ex 2v = Term 4, Master Thesis Spring

cont.

- 1) The courses are selected so that the total weighting each term amounts to 30 credits (Cr). Other optional courses may be chosen from the NTNU courses if there is not a conflict with respect to exam dates. The combination of optional courses must be approved by the programme.
- 2) This course is compulsory if a student chooses a thesis in TEP4930.
- 3) This course is compulsory if a student chooses a thesis in TIØ4955.
- 4) This course is compulsory if a student chooses a thesis in TPD4910.
- 5) This course is compulsory if a student chooses a thesis in POL3920.
- 6) The course is not considered when planning the teaching and examination schedules.
- 7) If a student chooses a thesis in POL3920 and does not have this course or a similar one in his bachelor's degree, this course is compulsory.
- 8) The student chooses one of these, and the choice must be approved by the programme taking into account the background of the student.
- 9) The student chooses one of these, and the choice must be approved by the programme taking into account the background of the student.

# FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY

## MSC-PROGRAMME IN INDUSTRIAL ECOLOGY (MSINDECOL)

Term 3 and 4 (2013/14)

Ex	Subject no	Subject title	Note	Cr	Specialization	
					1	2
		<b>Compulsory and optional courses</b>				
2h	TEP4222	INPUT-OUTPUT ANALYS	1	7,5	o	v
2h	TIØ4300	ENV SC ECOSYS SUST		7,5	v	v
2h	TIØ4525	SAFE HEALTH/ENV SC	2	7,5	v	v
2h	TPD4505	DESIGN THEORY SC		7,5	v	v
2h	TPK4160	VALUE CHAIN CONTR		7,5	v	v
2h	POL3507	POLICY ANALYSIS	3	15,0	v	v
		<b>Project and thesis preparation course</b>				
2h	TBA4580	IND ECOL PROJECT	4	15,0	v	-
2h	TEP5100	IND ECOL PROJECT		15,0	v	-
2h	TIØ5235	IND ECOL PROJECT	2	15,0	-	v
2h	TPD4190	DESIGN PROJECT		15,0	v	-
2h	POL3520	IND ECOL PROJECT	5	15,0	-	v
		<b>Master Thesis</b>				
2v	TBA4950	INDUSTRIAL ECOLOGY	4	30,0	v	-
2v	TEP4930	INDUSTRIAL ECOLOGY		30,0	v	-
2v	TIØ4955	INDUSTRIAL ECOLOGY	2	30,0	-	v
2v	TPD4910	INDUSTRIAL ECOLOGY		30,0	v	-
2v	POL3920	INDUSTRIAL ECOLOGY	5	30,0	-	v

o = Compulsory courses

v = Optional courses

Ex 2h = Term 3, Exam Autumn

Ex 2v = Term 4, Master Thesis Spring

- 1) The courses are selected so that the total weighting each term amounts to 30 credits (Cr). Other optional courses may be chosen from the NTNU courses. The combination of optional courses must be approved by the programme.
- 2) This course is compulsory for students in Specialization 2 who want to write a project and a thesis with a supervisor from the Dep. of Industrial Economics and Technology Management.
- 3) The course is taught upon availability. The course is not considered when planning the teaching and examination schedules.
- 4) Students in Specialization 1 choose one of the options depending on which department their supervisor belongs to.
- 5) This course is compulsory for students in Specialization 2 who want to write a project and a thesis with a supervisor from the Dep. of Sociology and Political Science.

Specialization:

1 Environmental Systems Analysis

2 Environmental Politics and Management

For Specialization 2, in term 3 (2h) students must choose different compulsory courses depending on from which department they want to have a supervisor; from the Dep. of Industrial Economics and Technology Management or the Dep. of Sociology and Political Science. In order to have a supervisor from the Dep. of Sociology and Political Science the student must have at least 60 ECTS credits of Political Science courses in his bachelor degree.

# FACULTY OF INFORMATION TECHNOLOGY, MATHEMATICS AND ELECTRICAL ENGINEERING

## MSC-PROGRAMME IN INFORMATION SYSTEMS (MSINFOSYST)

Term 1, 2, 3 and 4

Ex	Subject no.	Subject title	Note	Cr	Specialization	
					1	2
		<b>Compulsory and optional courses</b>	1			
1h	TDT4235	SOFTWARE QUALITY		7,5	v	v
1h	TDT4237	SOFTWARE SECURITY		7,5	v	-
1h	TDT4245	COOPERATION TECHN		7,5	v	v
1h	TDT4250	MODEL-DRIVEN DEV IS		7,5	o	o
1h	TDT4290	CUSTOMER DRIVEN PROJ		15,0	o	o
1h	TPK5100	PROJ PLAN/CONTR		7,5	v	v
1v	-	EXP IN TEAM INT PROJ		7,5	o	o
1v	TDT4215	WEB INTELLIGENCE		7,5	o	o
1v	TDT4240	SOFTWARE ARCHITECT		7,5	v	v
1v	TDT4242	REQUIREMENT TEST		7,5	v	v
1v	TDT4252	ENTERPR MOD/ARC		7,5	v	o
1v	TTM4115	ENG DIST REAL SYST		7,5	v	-
2h	TDT4501	COMPUTER SCIENCE SP		15,0	o	o
2h	TDT4506	COMPUTER SCIENCE SC		7,5	o	o
2h	TBA5200	PROJ PLAN/ANALYSIS		7,5	v	v
2h	TDT4210	HEALTHCARE INFORM		7,5	v	v
2h	TIØ4180	INNOV MANAGEM		7,5	v	-
2h	IT3010	RESEARCH METHODOLOGY		7,5	v	-
		<b>Master Thesis</b>				
2v	TDT4900	COMPU INFO SCIENCE		30,0	o	o

o - compulsory courses

v - optional courses

1) Optional courses must be selected to obtain a total of 30 credits in each semester.

Specialization:

1 Information Systems

2 Information Systems Engineering\*

\*Possible for students accepted for this specialization to have the 3rd semester at one of the order EUROMISE universities (NTNU, KTH, UPValencia, Politecnico Milano, UnivDelft, Twente, Sorbonne, Tech Univ Catalonia).

## FACULTY OF NATURAL SCIENCES AND TECHNOLOGY

### MSC-PROGRAMME IN LIGHT METALS, SILICON AND FERROALLOY PRODUCTION (MSLISIFER)

Term 1, 2, 3 and 4

Ex	Subject no.	Subject title	Note	Cr
		<b>Compulsory courses</b>		
1h	TMT4145	CERAMIC ENGINEERING		7,5
1h	TMT4155	HETEROGEN EQUILIBRIA		7,5
1h	TMT4306	MET PROD FERROALLOY		7,5
1h	TMT4330	RES ENERGY ENVIRONM		7,5
1v	TMT4208	FLUID/HEAT TRANSF AC		7,5
1v	TMT4252	ELECTROCHEMISTRY		7,5
1v	TMT4850	EXP IN TEAM INT PROJ		7,5
		<b>Optional courses</b>	1	
1v	MT8301	CARBON MAT TECHN		7,5
1v	TMT4166	EXP MATR/ELECTR CHEM		7,5
		<b>Compulsory courses</b>		
2h	TMT4326	REFIN/RECYL METALS		7,5
2h	TMT4330	RES ENERGY ENVIRONM		7,5
2h	TMT5500	PROC MET ELECTR SP		15,0
		<b>Master Thesis</b>		
2v	TMT4905	MATR TECHN		30,0

Ex 1h = Term 1, Exam Autumn

Ex 1v = Term 2, Exam Spring

Ex 2h = Term 3, Exam Autumn

Ex 2v = Term 4, Master Thesis Spring

1) Select one of the courses.

# FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY

## MSC-PROGRAMME IN MARINE TECHNOLOGY (MSN1)

Term 1, 2, 3 and 4

Ex	Subject no.	Subject title	Note	Cr	Specialization							
					MS	MC	MH	ME	MO	MD	MR	
		<b>Compulsory and optional courses</b>	1									
1h	TEP4156	VISCOUS FLOWS		7,5	-	-	v	-	-	-	-	-
1h	TEP4165	COMP HEAT/FLUID FLOW		7,5	-	-	-	v	-	-	-	-
1h	TEP4185	NATURAL GAS TECHN		7,5	-	-	-	v	-	-	-	-
1h	TEP4275	INDUSTRIAL ECOLOGY		7,5	-	-	-	-	-	v	v	-
1h	TKT4124	MECHANICS 3		7,5	o	-	v4	-	-	-	-	-
1h	TMM4112	MACHINE ELEMENTS		7,5	-	-	-	v	-	-	-	-
1h	TMR4115	DESIGN METHODS		7,5	-	-	v	v	v	o	v	v
1h	TMR4130	RISK ANALYSIS		7,5	v	-	-	-	o	o	v	v
1h	TMR4137	SUST UTIL MAR RES		7,5	-	-	-	-	-	v	o	-
1h	TMR4190	FINITE ELEM METH		7,5	o	v	o	-	-	v	-	-
1h	TMR4200	FATIGUE/FRACTURE		7,5	v1	-	-	-	-	-	-	-
1h	TMR4215	SEA LOADS		7,5	o	o	o	-	-	-	-	v
1h	TMR4235	STOCK THEORY SEALOADS		7,5	v	-	v	-	-	-	-	-
1h	TMR4260	SAFE OPER/MAINTEN	2	7,5	-	-	-	o	o	o	v	v
1h	TMR4275	MOD/SIM/AN DYN SYS		7,5	-	o	v	o	v	v	v	v
1h	TMR4290	MAR ELECTR PROP SYST		7,5	-	v	-	o	-	v	v	-
1h	TMR4320	SIM BASED DESIGN		7,5	-	v3	v4	-	-	-	-	-
1h	TPK4120	SAFETY/RELIA ANALYSIS		7,5	-	-	-	-	o	-	-	-
1h	TTK4115	LINEAR SYST THEORY		7,5	-	v3	-	-	-	-	-	-
1h	TTK4150	NONLINEAR CONTR SYST		7,5	-	v	-	-	-	-	-	-
1v	-	EXP IN TEAM INT PRO		7,5	o	o	o	o	o	o	o	o
1v	TEP4170	HEAT AND COMB TECH		7,5	-	-	-	v	-	-	-	-
1v	TEP4215	ENERGY UTIL		7,5	-	-	-	v	-	-	-	-
1v	TMR4120	UNDERWATER ENG BC		7,5	-	-	-	-	-	v	-	-
1v	TMR4125	SHIP BUILDING		7,5	v	-	-	-	v	v	v	v
1v	TMR4135	MAR DES ADV VES/MET		7,5	-	-	-	-	v5	o	o	o
1v	TMR4140	DES MAR PROD PLANS		7,5	-	-	-	-	-	-	o	-
1v	TMR4170	MARINE STRUCTURES		7,5	v2	-	-	-	-	-	-	-
1v	TMR4182	MARINE DYNAMICS		7,5	o	o	o	-	-	-	-	v
1v	TMR4195	DESIGN OFFSHOR STRUC		7,5	o	-	v	-	-	-	-	-
1v	TMR4205	BUCKLING/COLLAPS STR		7,5	v1	-	-	-	-	-	-	-
1v	TMR4217	HYDRO HIGH-SPEED VEH		7,5	-	v	v	v	-	-	-	-
1v	TMR4220	NAVAL HYDRODYNAMICS		7,5	-	v	v	v	-	v	v	v
1v	TMR4222	MACH/MAINTEN		7,5	-	-	-	-	v5	-	-	-
1v	TMR4225	MARINE OPERATIONS		7,5	v	v	v	-	v	v	-	-
1v	TMR4230	OCEANOGRAPHY		7,5	-	-	v	-	-	-	-	-
1v	TMR4240	MARINE CONTROL SYST		7,5	-	o	-	v	-	-	-	-
1v	TMR4280	INT COMB ENGINES		7,5	-	-	-	o	v5	-	v	-
1v	TMR4315	PIPE SYSTEM DESIGN		7,5	-	-	-	v	v5	-	-	-
1v	TTK4190	GUIDANCE/CONTROL		7,5	-	v	-	-	-	-	-	-
		<b>Supplementary courses</b>	1,3									
1h	BI3061	BIOL OCEAN		7,5	-	-	-	-	-	v	v	v
1h	TEP4185	NATURAL GAS TECHN		7,5	-	-	-	-	-	v	v	v
1h	TMM4112	MACHINE ELEMENTS		7,5	-	-	-	-	-	-	-	-
1h	TMR4200	FATIGUE/FRACTURE		7,5	-	-	v	-	-	-	-	v
1h	TMR4320	SIM BASED DESIGN		7,5	-	-	-	-	-	-	-	v
1h	TPK5100	PROJ PLAN/CONTR		7,5	-	-	-	-	-	-	-	v
1h	TTT4175	MARIN ACOUSTIC		7,5	-	-	-	-	-	v	v	v
1v	TEP4112	TURBULENT FLOWS	2	7,5	-	-	v	-	-	-	-	-
1v	TEP4220	ENERGY/ENVIRONMENT		7,5	-	-	-	-	-	-	-	v
1v	TMA4275	LIFETIME ANALYSIS		7,5	-	-	-	-	v	-	-	-
1v	TMR4120	UNDERWATER ENG BC		7,5	-	-	-	-	v5	-	-	v
1v	TMR4220	NAVAL HYDRODYNAMICS		7,5	v	-	-	-	-	-	-	-
1v	TMR4230	OCEANOGRAPHY		7,5	-	v	-	-	-	-	-	v
1v	TPG4200	SUBSEA PROD SYST		7,5	-	-	-	-	v	-	-	-
1v	TPK4110	QUAL/PERF MANAGEMENT		7,5	-	-	-	-	v	-	-	v
1v	TTK4135	OPTIMISATION/CONTROL		7,5	-	v	-	-	-	-	-	-

cont.



# FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY

## MSC-PROGRAMME IN MARINE TECHNOLOGY (MSN1)

Ex	Subject no.	Subject title	Note	Cr	Specialization						
					MS	MC	MH	ME	MO	MD	MR
		<b>Specialization courses</b>									
2h	TMR4505	MARINE STRUCTURE SC		7,5	o	-	-	-	-	-	-
2h	TMR4515	MAR CONTR SYST SC		7,5	-	o	-	-	-	-	-
2h	TMR4525	MARINE HYDRODYN SC		7,5	-	-	o	-	-	-	-
2h	TMR4535	MARINE ENGINEER SC		7,5	-	-	-	o	-	-	-
2h	TMR4555	OPERATION MAIN ENG SC		7,5	-	-	-	-	o	-	-
2h	TMR4565	MARINE SYS DESIGN SC		7,5	-	-	-	-	-	o	-
2h	TMR4575	MARINE RES/AQUA SC		7,5	-	-	-	-	-	-	o
		<b>Specialization projects</b>									
2h	TMR4500	MARINE STRUCTURE SP		7,5	o	-	-	-	-	-	-
2h	TMR4510	MAR CONTR SYST SP		7,5	-	o	-	-	-	-	-
2h	TMR4520	MARINE HYDRODYN SP		7,5	-	-	o	-	-	-	-
2h	TMR4530	MARINE ENGINEER SP		7,5	-	-	-	o	-	-	-
2h	TMR4550	OPERATION MAIN ENG SP		7,5	-	-	-	-	o	-	-
2h	TMR4560	MARINE SYS DESIGN SP		7,5	-	-	-	-	-	o	-
2h	TMR4570	MARINE RES/AQUA SP		7,5	-	-	-	-	-	-	o
		<b>Supplementary courses</b>	1,3								
2h	BI3061	BIO OCEANOGRAPHY		7,5	-	-	-	-	-	v	v
2h	TEP4156	VISCOUS FLOWS		7,5	-	-	v	-	-	-	-
2h	TEP4165	COMP HEAT/FLUID FLOW		7,5	-	-	-	v	-	-	-
2h	TEP4185	NATURAL GAS TECHN		7,5	-	-	-	v	-	v	v
2h	TEP4212	GAS CLEAN/EMISS CONTR		7,5	-	-	-	v	-	-	-
2h	TEP4275	INDUSTRIAL ECOLOGY		7,5	-	-	-	-	-	v	v
2h	TI04120	OP RESEARCH INTRO		7,5	-	-	-	-	v	-	v
2h	TI04130	OPT METHODS		7,5	-	-	-	-	-	v	-
2h	TMM4112	MACHINE ELEMENTS		7,5	-	-	-	v	v	-	-
2h	TMR4115	DESIGN METHODS		7,5	-	-	v	-	-	-	v
2h	TMR4130	RISK ANALYSIS		7,5	v	-	-	v	-	-	v
2h	TMR4137	SUST UTIL MAR RES		7,5	-	-	-	-	v	v	-
2h	TMR4190	FINITE ELEMENT METHOD		7,5	-	v	-	-	-	v	-
2h	TMR4200	FATIGUE/FRACTURE		7,5	v	-	v	-	-	v	-
2h	TMR4215	SEA LOADS		7,5	-	-	-	-	v	v	v
2h	TMR4235	STOCH THEORY SEALOAD		7,5	v	-	v	-	-	-	-
2h	TMR4243	MARINE CONTROL SYS 2		7,5	-	v	-	v	-	-	-
2h	TMR4260	SAFE OPER MAINT	2	7,5	-	-	-	-	-	-	v
2h	TMR4275	MOD/SIM/AN DYN SYS		7,5	-	-	v	-	v	v	v
2h	TMR4290	MAR ELECTR PROP SYST		7,5	-	v	-	-	v	v	v
2h	TMR4300	EXP/NUM HYDRODYN		7,5	-	-	v	-	-	-	-
2h	TMR4305	ADV ANALY MAR STRUCT		7,5	v	-	-	-	-	-	-
2h	TPK4160	VALUE CHAIN CONTROL		7,5	-	-	-	-	-	v	v
2h	TPK5100	PROJ PLAN/CONTR		7,5	-	-	-	-	v	v	v
2h	TTK4115	LINEAR SYST THEORY		7,5	-	v	-	v	-	-	-
2h	TTK4150	NONLINEAR CONTR SYST		7,5	-	v	-	-	-	-	-
2h	TTT4175	MARINE ACOUSTICS		7,5	-	-	-	-	-	v	v
		<b>Master Thesis</b>									
2v	TMR4930	MARINE TECHNOLOGY		30,0	o	o	o	o	o	o	o

o = compulsory course

v = optional course

Ex 1h = Term 1, Exam Autumn

Ex 1v = Term 2, Exam Spring

Ex 2h = Term 3, Exam Autumn

Ex 2v = Term 4, Master Thesis Spring

v1 - select one of the courses

v2 - compulsory course for students without equivalent background

v3 - select one of the two courses based on background

v4 - select at least one of the courses

v5 - select at least two of the courses

- 1) Courses should be selected so that the total weighting each term amounts to 30 credits (cr).
- 2) The course will not be taught in the academic year 2013/14.
- 3) Supplementary courses are not considered when planning the teaching and examination schedules.

Specializations:

MS - Marine structures

MC - Marine cybernetics

MH - Marine hydrodynamics

ME - Marine engineering

MO - Marine operation and maintenance engineering

MD - Marine systems design

MR - Marine resources and aquaculture

**FACULTY OF NATURAL SCIENCES AND TECHNOLOGY**  
**MSC-PROGRAMME IN MEDICAL TECHNOLOGY (MSMEDTEK)**

Term 1, 2, 3 and 4

Ex	Subject no.	Subject title	Note	Cr	Specialization			
					1	2	3	4
		<b>Compulsory and optional courses</b>						
1h	FY2302	BIOPHYSICS I		7,5	-	-	-	v
1h	IT3105	ART INTEL PROGR		7,5	-	v	-	-
1h	MFEL3010	MED FOR STUD OF NAT		7,5	o	o	o	o
1h	TDT4173	MACH LEAR/CASE REAS		7,5	-	v	v	-
1h	TDT4200	PARALLEL COMPUTING	1	7,5	-	v	v	-
1h	TDT4210	HEALTHCARE INFORM		7,5	-	o	v	-
1h	TDT4237	SOFTWARE SECURITY		7,5	-	v	-	-
1h	TDT4245	COOPERATION TECHN		7,5	-	v	-	-
1h	TDT4250	MODEL DRIVEN DEV IS		7,5	-	v	-	-
1h	TDT4287	ALG FOR BIOINF		7,5	-	v	-	-
1h	TFY4225	NUCLEAR/RAD PHYS		7,5	-	-	-	o
1h	TFY4265	BIOPHYSICAL MICROMET		7,5	-	-	-	v
1h	TFY4310	MOLECULAR BIOPHYSICS		7,5	-	-	-	v
1h	TTK4160	MEDICAL IMAGING	1	7,5	o	v	v	-
1h	TTK4170	MOD/IDENT BIOL SYS		7,5	-	-	-	v
1h	TTT4130	DIGITAL COMMUN	1	7,5	v	v	-	-
1h	TTT4135	MULTIMEDIA SIGNAL PRO		7,5	v	-	-	-
1h	TTT4175	MARINE ACOUSTICS		7,5	v	-	-	-
1v	-	EXP IN TEAM INT PROJ		7,5	o	o	o	o
1v	DT8112	RES TOP HEALTH INFO		7,5	-	v	-	-
1v	MOL3019	APPL BIOINFORMATICS		7,5	-	-	o	-
1v	MOL4010	BASIC MOL BIOL	2	7,5	-	-	o	-
1v	TBT4165	SYST BIOL/BIOL NETW		7,5	-	-	v	-
1v	TDT4175	INFORM SYSTEMS		7,5	-	v	-	-
1v	TDT4215	WEB INTELLIGENCE		7,5	-	v	-	-
1v	TDT4230	GRAPH/VISUAL		7,5	-	v	-	-
1v	TDT4240	SOFTWARE ARCHITECT		7,5	-	v	-	-
1v	TDT4242	REQUIREMENTS/TESTING		7,5	-	v	-	-
1v	TFY4280	SIGNAL PROCESSING		7,5	-	-	-	o
1v	TFY4315	BIOPHYS IONIZ RADIAT		7,5	-	-	-	o
1v	TFY4320	MEDICAL PHYSICS		7,5	v	-	v	o
1v	TMA4300	COMP STAT METHODS		7,5	-	-	v	-
1v	TTK4165	SIGNAL PROC MED IMAG		7,5	o	-	-	-
1v	TTT4125	INFO THEORY COD/COMP		7,5	o	-	-	-
1v	TTT4240	STAT SIGNAL THEORY		7,5	v	-	-	-
1v	TTT4245	MARINE ACOUSTICS II		7,5	v	-	-	-

cont.

## FACULTY OF NATURAL SCIENCES AND TECHNOLOGY

### MSC-PROGRAMME IN MEDICAL TECHNOLOGY (MSMEDTEK)

Ex	Subject no.	Subject title	Note	Cr	Specialization			
					1	2	3	4
2h	DT8119	CLIN DEC SUPPORT		7,5	-	v	-	-
2h	IT3105	ART INTEL PROGR		7,5	-	v	-	-
2h	TDT4173	MACH LEAR/CASE REAS		7,5	-	v	-	-
2h	TDT4200	PARALLEL COMPUTING		7,5	-	v	-	-
2h	TDT4237	SOFTWARE SECURITY		7,5	-	v	-	-
2h	TDT4287	ALGORITHMS BIOINFO		7,5	-	v	o	-
2h	TKT4150	BIOMECHANICS		7,5	-	-	-	v
2h	TTK4160	MEDICAL IMAGING		7,5	-	v	-	v
2h	TTT4130	DIGITAL COMMUN		7,5	-	v	-	-
2h	TTT4135	MULTIMEDIA SIGNAL PRO		7,5	o	-	-	-
		<b>Specialization courses</b>	3					
2h	TDT4535	BIOINFORMATICS SC		7,5	-	-	o	-
2h	TDT4545	HEALTHCARE INFO SC		7,5	-	o	-	-
2h	TFY4505	BIOPHYSICS SC		7,5	-	-	-	o
2h	TTK4555	ENG CYBERNETICS SC	4	7,5	v	-	-	-
2h	TTT4525	SIGNAL PROC SC	4	7,5	v	-	-	-
		<b>Specialization projects</b>						
2h	TDT4530	BIOINFORMATICS SP		15,0	-	-	o	-
2h	TDT4540	HEALTHCARE INFO SP		15,0	-	o	-	-
2h	TFY4500	BIOPHYSICS SP		15,0	-	-	-	o
2h	TTK4550	ENG CYBERNETICS SP	4	15,0	v	-	-	-
2h	TTT4520	SIGNAL PROC SP	4	15,0	v	-	-	-
		<b>Master Thesis</b>						
2v	TDT4900	COMP INFORM SCIENCE		30,0	-	o	o	-
2v	TFY4910	BIOPHYSICS		30,0	-	-	-	o
2v	TTK4900	ENGINEERING CYBERN	4	30,0	v	-	-	-
2v	TTT4900	SIGN PROC/COM	4	30,0	v	-	-	-

o = compulsory courses

v - optional courses

Ex 1h = Term 1, Exam Autumn

Ex 1v = Term 2, Exam Spring

Ex 2h = Term 3, Exam Autumn

Ex 2v = Term 4, Master Thesis Spring

Specialization:

1 Medical Signal Processing and Imaging

2 Healthcare Informatics

3 Bioinformatics

4 Biophysics and Medical Physics

1) The courses are not considered when planning the teaching and examination schedules.

2) Lectures are held in Norwegian, but PBL exercises and presentations are given in English.

3) Other relevant ordinary subjects may be chosen, if taught in english.

4) Students at specialization Medical Signal Processing and Imaging should choose one of the combinations TTK4550/TTK4555/TTK4900 or TTT4520/TTT4525/TTT4900.

## FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY

### MSC-PROGRAMME IN NATURAL GAS TECHNOLOGY (MSGASTECH)

Term 1, 2, 3 and 4

Ex	Subject no.	Subject title	Note	Cr
1h	TEP4185	<b>Compulsory courses</b> NATURAL GAS TECHN		7,5
1h	TPG4140	NATURAL GAS		7,5
1v	-	EXP IN TEAM INT PROJ		7,5
		<b>Optional courses</b>	1	
1h	TEP4135	ENG FLUID MECH 1		7,5
1h	TEP4156	VISC FLOW/BOUND LAYER		7,5
1h	TEP4165	COMP HEAT/FLUID FLOW		7,5
1h	TEP4180	EXP METH PROC ENG		7,5
1h	TEP4240	SYSTEM SIMULATION		7,5
1h	TKP4170	PROCESS DESIGN PROJ		7,5
1h	TPK4120	SAFETY/RELIABILITY	2	7,5
1v	TEP4170	HEAT/COMBUST TECH		7,5
1v	TEP4195	TURBO MACHINERY		7,5
1v	TEP4215	ENERG UTIL/PROC INT		7,5
1v	TEP4250	MULTIPHASE TRANSPORT		7,5
1v	TEP4255	HEAT PUMP PROC SYST	2	7,5
1v	TKP4150	PETROCH/OIL REFINING		7,5
1v	TMT4285	HYDROGEN TECHN	2	7,5
1v	TPG4135	PROC OF PETR		7,5
1v	TPG5110	PETROLEUM ECONOMICS	2	7,5
		<b>Specialization courses</b>	3	
2h	TEP4515	THERMAL ENERGY SC		7,5
2h	TEP4525	INDUS PROC TECHN SC		7,5
2h	TEP4545	ENG FLUID MECH SC		7,5
		<b>Specialization projects</b>	4	
2h	TEP4510	THERMAL ENERGY SP		15,0
2h	TEP4520	INDUS PROC TECHN SP		15,0
2h	TEP4540	ENG FLUID MECH SP		15,0
		<b>Supplementary courses</b>	5	
2h	TEP4135	ENG FLUID MECH		7,5
2h	TEP4165	COMP HEAT/FLUID FLOW		7,5
2h	TEP4180	EXP METH PROC ENG		7,5
2h	TEP4240	SYSTEM SIMULATION		7,5
2h	TKP4170	PROCESS DESIGN PROJ		7,5
2h	TPK4120	SAFETY RELIABILITY		7,5
		<b>Master Thesis</b>	6	
2v	TEP4905	INDUS PROC TECHN		30,0
2v	TEP4915	THERMAL ENERGY		30,0
2v	TEP4925	ENG FLUID MECH		30,0

Ex 1h = Term 1, Exam Autumn

Ex 1v = Term 2, Exam Spring

- 1) Optional courses must be selected to obtain a total of 30 credits in each semester.
- 2) The course is not considered when planning the teaching and examination schedules.
- 3) One specialization course must be chosen.
- 4) One specialization project must be chosen according to the selected specialization course.
- 5) Supplementary courses must be selected to obtain a total of 30 credits per semester. The courses are not considered when planning the teaching and examination schedules.
- 6) The master thesis must be chosen according to the selected specialization.

# FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY

## MSC-PROGRAMME IN PETROLEUM ENGINEERING (MSG1)

Term 1, 2, 3 and 4

Ex	Subject no.	Subject title	Note	Cr	Specialization		
					1	2	3
		<b>Compulsory and optional courses</b>					
1h	TPG4117	UNCONVENT RESERVOIRS	1	7,5	v	-	-
1h	TPG4145	RESERVOIR FLUIDS		7,5	o	v	o
1h	TPG4150	RESERVOIR REC TECHN		7,5	o	o	o
1h	TPG4151	SUBSUR DECIS ANALYS	2	7,5	v	v	v
1h	TPG4162	3D VISUAL PETR DATA	2	7,5	v	v	v
1h	TPG4175	PETROPHYSICS FUND		7,5	v	v	v
1h	TPG4177	CARB RESERVOIR CHAR		7,5	v	v	v
1h	TPG4215	HIGH DEV DRILLING		7,5	v	o	v
1h	TPG4235	WELL TESTING AC		7,5	v	v	v
1h	TPG5100	MATH/COMPUTER METHOD		7,5	o	o	o
1h	TPG5140	SPEC SUB SURF MAN	2	7,5	v	v	v
1v	-	EXP IN TEAM INT PROJ		7,5	o	o	o
1v	TPG4115	RES PROP DETERMIN		7,5	v	-	-
1v	TPG4160	RESERVOIR SIMULATION		7,5	o	v	v
1v	TPG4180	PETR PHYS INTERPR AC		7,5	v	v	v
1v	TPG4205	DRILL TECH PR CONTR		7,5	v	v	v
1v	TPG4220	DRILLING FLUID		7,5	v	o	v
1v	TPG4225	FRACTURED RESERVOIRS	2	7,5	v	-	-
1v	TPG4230	FIELD DEVELOPMENT		7,5	v	v	o
1v	TPG5110	PETROLEUM ECONOMICS	2	7,5	v	v	v
2h	TPG4140	NATURAL GAS		7,5	v	v	v
2h	TPG4177	CARB RESERVOIR CHAR		7,5	v	v	v
2h	TPG4185	FORMATION MECHANICS		7,5	v	v	v
2h	TPG4235	WELL TESTING AC		7,5	v	v	v
2h	TPG4250	ELECTROM METH OIL EX		7,5	v	v	v
2h	TPG4255	CO2 STORAGE		7,5	v	v	v
		<b>Specialization courses</b>					
2h	TPG4515	PETR PROD SC		7,5	-	-	o
2h	TPG4525	DRILLING ENG SC		7,5	-	o	-
2h	TPG4535	RESERVOIR ENG SC		7,5	o	-	-
		<b>Specialization project</b>					
2h	TPG4510	PETR PROD SP		15,0	-	-	o
2h	TPG4520	DRILLING ENG SP		15,0	-	o	-
2h	TPG4530	RESERVOIR ENG SP		15,0	o	-	-
		<b>Master Thesis</b>					
2v	TPG4920	PETROL ENGINEERING		30,0	o	o	o

o - compulsory courses

v - optional courses

Ex 1h = Term 1, Exam Autumn

Ex 1v = Term 2, Exam Spring

Ex 2h = Term 3, Exam Autumn

Ex 2v = Term 4, Master Thesis Spring

- 1) The courses must be selected to obtain a total of 30 credits in each semester. In addition to the subjects listed 2h students can choose from 1h Petroleum Engineering, 1h Petroleum Geosciences and PhD-courses.
- 2) The course is not considered when planning the teaching and examination schedules.

Specialization:

- 1 Reservoir Engineering and Petrophysics
- 2 Drilling Engineering
- 3 Petroleum Production

# FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY

## MSC-PROGRAMME IN PETROLEUM GEOSCIENCES (MSG2)

Term 1, 2, 3 and 4

Ex	Subject no.	Subject title	Note	Cr	Specialization	
					1	2
		<b>Compulsory and optional courses</b>				
1h	TGB4160	PETROLEUM GEOLOGY	1	7,5	v	o
1h	TGB4265	STRUCT GEOLOGY AC	2	7,5	v	v
1h	TPG4120	MIN ENG/ENV GEOPH	2	7,5	v	v
1h	TPG4125	SEISMIC WAVE PROP		7,5	o	o
1h	TPG4150	RESERVOIR REC TECHN		7,5	v	v
1h	TPG4162	3D VISUAL PETR DATA	2	7,5	v	v
1h	TPG4175	PETROPHYSICS BC		7,5	v	v
1h	TPG4177	CARB RESERVOIR CHAR		7,5	v	v
1h	TPG4185	FORMATION MECHANICS		7,5	v	v
1h	TPG4195	GRAVIMETR MAGNETOMET		7,5	v	v
1h	TPG4250	ELECTROM METH OIL EX	2	7,5	v	v
1h	TPG5100	APPL COMPUTER METHODS		7,5	o	o
1h	TPG5130	SEISMIC PROCESSING	2	7,5	v	v
1v	-	EXP IN TEAM INT PROJ		7,5	o	o
1v	TGB4135	BASIN ANALYSIS		7,5	v	v
1v	TGB4170	DIAGENESIS/RES QUAL		7,5	v	v
1v	TGB4275	GEOL RES MOD		7,5	v	v
1v	TPG4130	SEISMIC INTERPRET		7,5	o	o
1v	TPG4170	RESERVOIR SEISMICS		7,5	v	v
1v	TPG4180	PETR PHYS INTERPR AC		7,5	v	v
1v	TPG5110	PETROLEUM ECONOMICS	2	7,5	v	v
2h	TPG4151	SUBSUR DECIS ANALYS		7,5	-	v
2h	TPG4177	CARB RESERVOIR CHAR		7,5	-	v
2h	TPG4190	SEISMIC DATA		7,5	o	v
2h	TPG4255	CO2 STORAGE		7,5	-	v
		<b>Specialization courses</b>				
2h	TGB4565	PETR GEOLOGY SC		7,5	-	o
2h	TPG4545	PETR GEOPHYS SC		7,5	o	-
		<b>Specialization project</b>				
2h	TGB4560	PETR GEOLOGY SP		15,0	-	o
2h	TPG4540	PETR GEOPHYS SP		15,0	o	-
		<b>Master Thesis</b>				
2v	TGB4915	PETROLEUM GEOSCIENCE		30,0	-	o
2v	TPG4925	PETROLEUM GEOSCIENCE		30,0	o	-

o - compulsory courses

v - optional courses

Ex 1h = Term 1, Exam Autumn

Ex 1v = Term 2, Exam Spring

Ex 2h = Term 3, Exam Autumn

Ex 2v = Term 4, Master Thesis Spring

- 1) The courses must be selected to obtain a total of 30 credits in each semester. In addition to the subject listed 2h (TPG4190) students in specialization 2 can choose from 1h Petroleum Engineering, 1h Petroleum Geosciences and PhD-courses.
- 2) The course is not considered when planning the teaching and examination schedules.

Specialization:

1 Petroleum Geophysics

2 Petroleum Geology

# FACULTY OF SOCIAL SCIENCES AND TECHNOLOGY MANAGEMENT

## MSC-PROGRAMME IN PROJECT MANAGEMENT (MSPROMAN)

Term 1, 2, 3 and 4

Ex	Subject no.	Subject title	Note	Cr	Specialization		
					1	2	3
		<b>Compulsory courses</b>	1				
1h	TBA5200	PROJ PLAN/ANALYSIS		7,5	o	o	o
1h	TIØ5200	PROJ ORG		7,5	o	o	o
1h	TPK5100	PROJ PLAN/CONTR		7,5	o	o	o
1v	-	EXP IN TEAM INT PROJ		7,5	o	o	o
1v	TIØ5210	PROGRAM MGMT		7,5	o	o	o
1v	TIØ5215	GLOB GOV OF SUPPLY		7,5	o	o	o
		<b>Optional courses</b>	1				
1h	TBA4315	ECONOM/TRANSP INFRA		7,5	v	-	-
1h	TIØ4265	STRATEGIC MANAGEMENT		7,5	-	v	-
1h	TPK5160	RISK ANALYSIS		7,5	-	-	v
1v	TGB5110	ENG GEO/TUNNEL BC		7,5	v	-	-
1v	TIØ4175	PURCH LOG MGMT		7,5	-	v	-
1v	TPK4110	QUAL/PERFORMANCE		7,5	-	-	v
		<b>Compulsory and optional courses</b>	2				
2h	TPK5115	RISK MANAGEM PROJ		7,5	v	-	v
2h	TIØ4345	MAN BUS RELAT/NETW		7,5	-	v	-
		<b>Specialization courses</b>					
2h	TBA4128	PRO MAN AC		7,5	o	-	-
2h	TIØ5225	PRO MAN SC		7,5	-	o	-
2h	TPK4505	PRO MAN SC		7,5	-	-	o
		<b>Specialization projects</b>					
2h	TBA4530	PRO MAN SP		15,0	o	-	-
2h	TIØ5230	PRO MAN SP		15,0	-	o	-
2h	TPK4500	PRO MAN SP		15,0	-	-	o
		<b>Master Thesis</b>					
2v	TBA4910	PROJ MANAGEMENT		30,0	o	-	-
2v	TIØ4920	PROJ MANAGEMENT		30,0	-	o	-
2v	TPK4905	PROJ MANAGEMENT		30,0	-	-	o

o - compulsory courses

v - optional courses

Ex 1h = Term 1, Exam Autumn

Ex 1v = Term 2, Exam Spring

Ex 2h = Term 3, Exam Autumn

Ex 2v = Term 4, Master Thesis Spring

- 1) In addition to the compulsory courses, the student must select 15 cr relevant for their technological specialization. Optional courses listed are recommended, but students may substitute other courses from the same department with Faculty permission.
- 2) In the second year, the student will choose a specialization project, specialization course and master thesis corresponding to the technological specialization chosen in the first year. In addition, they need an extra course in 3rd semester. Recommended courses are shown in the table, but students may substitute other courses from the same department with Faculty permission.

Specialization:

1. Civil Engineering
2. Industrial Engineering
3. Production and Quality Engineering



## FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY

### MSC-PROGRAMME IN RELIABILITY, AVAILABILITY, MAINTAINABILITY AND SAFETY (MSRAMS)

Term 1, 2, 3 and 4

Ex	Subject no.	Subject title	Note	Cr
		<b>Compulsory courses</b>		
1h	TPK4120	SAFETY/RELIABILITY		7,5
1h	TPK4140	MAIN MANAGEMENT		7,5
1h	TPK5115	RISK MANAGEM PROJ		7,5
1h	TPK5160	RISK ANALYSIS		7,5
1v	-	EXP IN TEAM INT PROJ		7,5
1v	TIØ4205	SHE-METH/TOOLS SHE	1	7,5
1v	TMA4255	APPLIED STATISTICS	1	7,5
1v	TMA4275	LIFETIME ANALYSIS	1	7,5
1v	TPK5165	RAMS ENG/MANAGEMENT		7,5
2h	FI5205	CORP RESPONS ETHICS	2	7,5
2h	SPRÅK3501	SCIENTIFIC COM	2	7,5
2h	TEP4223	LIFE CYCLE ASSESSMENT	2	7,5
2h	TIØ4201	RISK GOVERNANCE	2	7,5
2h	TPK4510	PROD QUALITY ENG SP		15,0
2h	TPK5170	RAMS OPTIMISATION		7,5
		<b>Master Thesis</b>		
2v	TPK4900	PROD QUALITY ENG		30,0

Ex 1h = Term 1, Exam Autumn

Ex 1v = Term 2, Exam Spring

Ex 2h = Term 3, Exam Autumn

Ex 2v = Term 4, Master Thesis Spring

- 1) Select two of the courses.
- 2) Select one of the courses.

**FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY**  
**MSC-PROGRAMME IN SUSTAINABLE ENERGY (MSSE)**

Term 1, 2, 3 and 4

Ex	Subject no.	Subject title	Note	Cr
		<b>Compulsory courses</b>		
1h	TEP4165	COMP HEAT/FLUID FLOW		7,5
1h	TEP4185	NATURAL GAS TECHN		7,5
1v	-	EXP IN TEAM INT PROJ		7,5
1v	TEP4125	THERMODYNAMICS 2		7,5
1v	TEP4255	HEAT PUMP PROC SYST		7,5
		<b>Optional courses</b>		
1h	TEP4180	EXP METH PROC ENG	1	7,5
1h	TEP4212	GAS CLEAN/EMISSION	2	7,5
1h	TEP4223	LIFE CYCLE ASSESSM	2	7,5
1h	TEP4235	ENERGY MANAG BUILD	2	7,5
1h	TEP4240	SYSTEM SIMULATION	1	7,5
1v	TEP4220	ENERGY/ENV CONSEQUEN	3	7,5
1v	TEP4260	HEAT PUMP BUILDINGS	3	7,5
1v	TEP4265	THERMAL BIOMATERIALS	3	7,5
		<b>Specialization</b>		
2h	KULT2207	GENDER/NORW CULTURE		7,5
2h	TEP4520	INDUS PROC TECHN SP		15,0
2h	TEP4525	INDUS PROC TECHN SC		7,5
		<b>Master Thesis</b>		
2v	TEP4905	INDUS PROC TECHN		30,0

Ex 1h = Term 1, Exam Autumn

Ex 1v = Term 2, Exam Spring

Ex 2h = Term 3, Exam Autumn

Ex 2v = Term 4, Master Thesis Spring

- 1) Select one of the courses.
- 2) Select one of the courses.
- 3) Select one of the courses.

**FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY**  
**MSC-PROGRAMME IN SUSTAINABLE ENERGY (MSSE)**

Term 1, 2, 3 and 4

Ex	Subject no.	Subject title	Note	Cr
		<b>Compulsory courses</b>		
1h	TEP4165	COMP HEAT/FLUID FLOW		7,5
1h	TEP4185	NATURAL GAS TECHN		7,5
1v	-	EXP IN TEAM INT PROJ		7,5
1v	TEP4125	THERMODYNAMICS 2		7,5
1v	TEP4255	HEAT PUMP PROC SYST		7,5
		<b>Optional courses</b>		
1h	TEP4180	EXP METH PROC ENG	1	7,5
1h	TEP4212	GAS CLEAN/EMISSION	2	7,5
1h	TEP4223	LIFE CYCLE ASSESSM	2	7,5
1h	TEP4235	ENERGY MANAG BUILD	2	7,5
1h	TEP4240	SYSTEM SIMULATION	1	7,5
1v	TEP4220	ENERGY/ENV CONSEQUEN	3	7,5
1v	TEP4260	HEAT PUMP BUILDINGS	3	7,5
1v	TEP4265	THERMAL BIOMATERIALS	3	7,5
		<b>Specialization</b>		
2h	KULT2207	GENDER/NORW CULTURE		7,5
2h	TEP4520	INDUS PROC TECHN SP		15,0
2h	TEP4525	INDUS PROC TECHN SC		7,5
		<b>Master Thesis</b>		
2v	TEP4905	INDUS PROC TECHN		30,0

Ex 1h = Term 1, Exam Autumn

Ex 1v = Term 2, Exam Spring

Ex 2h = Term 3, Exam Autumn

Ex 2v = Term 4, Master Thesis Spring

- 1) Select one of the courses.
- 2) Select one of the courses.
- 3) Select one of the courses.

## FACULTY OF INFORMATION TECHNOLOGY, MATHEMATICS AND ELECTRICAL ENGINEERING

### MSC-PROGRAMME IN TELEMATICS - COMMUNICATION NETWORKS AND NETWORKED SERVICES (MSTCNNS)

Term 1, 2, 3 and 4

Ex	Subject no.	Subject title	Note	Cr	Specialization		
					1	2	3
		<b>Compulsory courses</b>					
1h	TTM4105	ACCESS TRANS NETW		7,5	o	o	o
1h	TTM4110	DEP AND PER WITH SIM		7,5	o	o	o
1h	TTM4150	INTERNET NETW ARCH		7,5	o	o	o
1v	-	EXP IN TEAM INT PROJ		7,5	o	o	o
1v	TTM4115	ENG DIST REAL SYS		7,5	o	o	o
1v	TTM4135	INFORMATION SEC		7,5	o	o	o
		<b>Optional courses</b>	1				
1h	TDT4235	SOFTWARE QUALITY		7,5	v	v	v
1h	TDT4237	SOFTWARE SECURITY		7,5	v	v	v
1v	TTM4120	DEPENDABLE SYSTEMS		7,5	v	v	v
1v	TTM4128	NETW AND SERV MAN		7,5	v	v	v
1v	TTM4130	SERV INT AND MOB		7,5	v	v	v
		<b>Specialization courses</b>					
2h	TTM4516	NETWORKS/QUALITY SC		7,5	o	-	-
2h	TTM4526	SERV AND SYST ENG SC		7,5	-	o	-
2h	TTM4536	INFO SECURITY SC		7,5	-	-	o
		<b>Specialization projects</b>					
2h	TTM4511	NETWORKS/QUALITY SP		15,0	o	-	-
2h	TTM4521	SERV AND SYST ENG SP		15,0	-	o	-
2h	TTM4531	INFO SECURITY SP		15,0	-	-	o
2h	TTM4137	WIRELESS SECURITY		7,5	-	-	o
2h	TTM4155	TELETRAFFIC THEORY		7,5	o	-	-
2h	TTM4160	SOFTWARE DESIGN		7,5	-	o	-
		<b>Master Thesis</b>					
2v	TTM4905	NETWORKS/SERVICES		30,0	o	o	o

o = compulsory courses

v = optional courses

Ex 1h = Term 1, Exam Autumn

Ex 1v = Term 2, Exam Spring

Ex 2h = Term 3, Exam Autumn

Ex 2v = Term 4, Master Thesis Spring

1) Select one of the courses each semester.

Specialization:

1 Networks and Quality of Service

2 Services and Systems Engineering

3 Information Security

## FACULTY OF NATURAL SCIENCE AND TECHNOLOGY

### NORDIC MASTER'S PROGRAMME IN INNOVATIVE SUSTAINABLE ENERGY ENGINEERING (MSISEE)

Term 1 and 2\*

#### SYSTEM INTEGRATION OF WIND POWER

Ex	Subject no.	Subject title	Note	Cr
		<b>Compulsory courses</b>		
1h	TET4115	POWER SYSTEM ANALYS		7,5
1h	TET4190	POWER ELECTR REN ENER		7,5
1h	TEP4175	ENERGY INV FLOWS		7,5
1v	TEP4220	ENERGY/ENV CONSEQ		7,5
1v	TET4175	DES/OPER SMART GRID		7,5
1v	TET4185	POWER MARK RES/ENV		7,5
		<b>Optional courses</b>	1	
1h	TEP4240	SYSTEM SIMULATION		7,5
1h	TEP4275	INDUSTRIAL ECOLOGY		7,5
1h	TIØ4556	ENERGY MARKETS SC		7,5
1v	-	EXP IN TEAM INT PROJ		7,5
1v	TET4135	ENERGY/SYST PLAN/OP		7,5
1v	TET4180	ELECT POW SYST STAB		7,5
1v	TET4200	MAR/OFFSH POW SYST		7,5
1v	TEP4150	ENERGY MANAGEM/TECH		7,5

Ex 1h = Term 1, Exam Autumn

Ex 1v = Term 2, Exam Spring

1) Optional courses must be selected to obtain a total of 30 credits in each semester.

The Innovative and Sustainable Energy Engineering (ISEE) programme is a joint Nordic master programme between six Nordic Universities in five Nordic Countries.

\* The second year, term 3 and 4, are taught at the Technical University of Denmark (DTU).

For further information see  
[www.msisee.org](http://www.msisee.org)  
[www.ntnu.edu/studies/msisee](http://www.ntnu.edu/studies/msisee)

## FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY

### NORDIC MASTER'S PROGRAMME IN INNOVATIVE SUSTAINABLE ENERGY ENGINEERING (MSISEE)

Term 3 and 4\* 2014/15

#### SOLAR CELL SYSTEMS AND MATERIALS

Ex	Subject no	Subject title	Note	Cr
		<b>Optional courses</b>	1	
2h	FY3114	FUNC MATERIALS	2	7,5
2h	TEP4220	ENERGY/ENV CONSEQ	2	7,5
2h	TFE4145	SEMICON PHYS/ELECTR	2	7,5
2h	TFY4255	MATERIALS PHYSICS	2	7,5
2h	TFY4300	ENERGY/ENV PHYSICS	2	7,5
2h	TMT4306	METAL PRODUCTION	3	7,5
2h	TMT4322	SOLAR CELLS/PHOTO	2,3	7,5
2h	TMT4326	REFIN/RECYC METALS	3	7,5
		<b>Specialization projects</b>	4	
2h	TFYxxxx	SEMESTER PROJECT		15,0
2h	TMTxxxx	SEMESTER PROJECT		15,0
		<b>Master Thesis</b>	5	
2v	TFY49xx	SOLAR CELL SYST/MATR		30,0
2v	TMT49xx	SOLAR CELL SYST/MATR		30,0

Ex 2h = Term 3, Exam Autumn

Ex 2v = Term 4, Master Thesis Spring

- 1) Optional courses must be selected to obtain a total of 30 credits in each semester.
- 2) Optional courses available for students choosing the Physics specialization.
- 3) Optional courses available for students choosing the Materials specialization.
- 4) One specialization project must be chosen according to the selected specialization.
- 5) The master thesis must be chosen according to the selected specialization.

The Innovative and Sustainable Energy Engineering (ISEE) programme is a joint Nordic master programme between six Nordic Universities in five Nordic Countries.

\* The first year, term 1 and term 2 are taught at the Technical University of Denmark (DTU).

For further information see  
[www.msisee.org](http://www.msisee.org)  
[www.ntnu.edu/studies/msisee](http://www.ntnu.edu/studies/msisee)

## MASTER OF ARTS IN DANCE STUDIES

### Knowledge

Master graduates in dance studies

- have specialised knowledge about application and development of dance studies
- have knowledge about theory and methods in the fields such as analysis, history, anthropology and theory of dance
- have knowledge about the central and the most actual research topics in the field

### Skills

Master graduates in dance studies

- can use the knowledge and methods to implement analytical projects on a high level
- can use knowledge to develop an in-depth project in a particular field of dance
- can run independent projects based on research

### General competences

Master graduates in dance studies

- can approach phenomena from different perspectives
- can present or perform arguments in oral and written form using an appropriate terminology
- can develop ideas and formulate problems in the field of studies; can collect, use and present subject matter, give advice and make professional evaluations

### Admission requirements

The programme is open to both international and Norwegian students. Admittance to the programme requires a bachelor's degree in dance studies or another relevant discipline combined with good background in dance, or other equivalent education. Possible admission to the programme of study requires a minimum of an average grade of C or the equivalent. C is however, not a guarantee for admission.

### Course overview

Codes	Course	Credits	Semester	Restricted admission
DANS3003	Dance Analysis	15	Autumn	Yes 1)
DANS3005	Field and Archiving Techniques	15	Autumn	Yes 1)
DANS3010	Master Thesis	30	Autumn and Spring	Yes 2)
DANS6016	Phenomenology in performance	15	Spring	

- 1) Requires admission to Nordic Master in Dance Studies or Erasmus mundus master program *Choreomundus* - International master in Dance Knowledge, Practice and Heritage
- 2) Requires admission to Nordic Master in Dance Studies

## The Table of Structure

Below follows an overview of the structure of the Nordic master in Dance Studies:

Semester	7,5 ECTS Credits	7,5 ECTS Credits	7,5 ECTS Credits	7,5 ECTS Credits
<b>4th semester Spring</b>	DANS3010 Master's Thesis in Dance Studies (NTNU)		Dance Anthropology (University of Tampere)	
<b>3rd semester Autumn</b>	DANS3010 Master's Thesis in Dance Studies (NTNU)		Dance History (University of Copenhagen)	
<b>2nd semester Spring</b>	Dance and Cultural Theory (University of Stockholm)		Elective course (NTNU or University of Stockholm)	Elective course (NTNU or University of Stockholm)
<b>1st semester Autumn</b>	DANS3003 <i>Dance Analysis</i> (NTNU intensive course early september)		Elective course (NTNU or University of Stockholm)	

## Regulations of accreditation

When it comes to the accreditation of external training/education abroad, each case must be assessed individually. See general rules for equivalency. Application for transfer of Norwegian degrees is to be sent to the department. Application for recognition of foreign degrees is to be sent to the faculty. Those who are admitted to the Nordic Master's program in Dance studies have the opportunity to fulfil these requirements until the submission of master's thesis as stated in the individual master agreement.

## Development and structure

The master programme in dance studies includes four joint courses: *Dance analysis* taught at NTNU (15 ECTS), *Dance and cultural theory* taught at University of Stockholm (15 ECTS), *Dance history* taught at University of Copenhagen (15 ECTS) and *Dance anthropology* taught at University of Tampere (15 ECTS). The master thesis is 30 ECTS.

Additionally each partner university has to provide at least one freely chosen course of minimum 7, 5 ECTS. These courses are first of all meant for university's own students, but are open to all students as well. These study plans are considered in the agreement among universities and automatically recognized as part of the master study.

NTNU suggest four courses to choose freely from. Aesthetic is provided under the codes FI2101 *Spesialemne I i filosofi* (15 ECTS) or FI2103 *Spesialemne III i filosofi* (7, 5 ECTS). For more information, please, contact the Department of Philosophy, NTNU. Additionally, Department of Music provides DANS3005 *Field and Archiving Techniques* (15 ECTS) and DANS6016 *Phenomenology in performance* (15 ECTS).

University of Stockholm provides following free-chosen courses: TVARKI *Arkivuppgift* (7, 5 ECTS), TVKIAN *Kulturelle Iscensättningar* (15 ECTS), TVFLPR *Fältarbete/praktik* (7, 5 ECTS).



University of Copenhagen provides following free-chosen courses: *Studieelement 307 – Det frie emne II* (15 ECTS), *Studieelement 308 – Det frie emne III* (7,5 ECTS), *Studieelement 309 – Det frie emne IV* (7,5 ECTS) and *Studieelement 310 – Teknisk II: Teknikk, improvisation, komposition og formidling* (15 ECTS)

It is possible to apply for recognition of other free-chosen courses, if they are useful for the master thesis.

## **MASTER OF ARTS IN DANCE KNOWLEDGE, PRACTICE AND HERITAGE (Choreomundus)**

### **Learning outcomes**

Choreomundus is a two-year full time programme taught over four semesters at the four partner universities: Norwegian University of Science and Technology (NTNU), Blaise Pascal University (UBP), Scientific University of Szeged (SZTE), and University of Roehampton (URL). Students who successfully complete the programme gain 120 ECTS (European Credit Transfer System). They will be awarded a Joint Master's degree carrying the Erasmus Mundus label with diploma supplement. Every successful participant graduates simultaneously from the four European universities of the Choreomundus consortium.

During the course of study, students are introduced to theoretical, epistemological and methodological issues concerning the concept of Dance Heritage, with a focus on ethnographic material. This includes examples from the Nordic countries, from Eastern and Western Europe, from South Asia, Africa and Aboriginal Australia. Further examples will be provided by visiting scholars. The programme is committed to both movement and contextual analyses and has been designed to provide all students with a common scientific training to equip them with the intellectual tools necessary to analyse dance cross-culturally and to deal with dance as Intangible Cultural Heritage in diverse professional contexts. Fieldwork is an important feature, and brief field trips are undertaken in all four countries to allow students to engage fully with a number of European cultures. Moreover, an intensive period of fieldwork during the summer between the first and the second year, in a country of the student's choice is a prelude to the dissertation/thesis and a prerequisite to the successful completion of the Master's degree.

### **Knowledge**

Master graduates in Choreomundus

- have specialised knowledge about development of dance studies
- have knowledge about theory and methods in the fields such as analysis, anthropology and theory of dance
- have knowledge about the central and the most actual research topics in the field
- have in-depth knowledge about Intangible Cultural Heritage

### **Skills**

Master graduates in Choreomundus

- can use the knowledge and various methods to analyse dance on a high level
- can run independent fieldwork projects and do corresponding research
- can read and write dances notated in advanced Labanotation

### **General competences**

Master graduates in Choreomundus

- can approach phenomena from different perspectives
- can present or perform arguments in oral and written form using an appropriate terminology
- can develop ideas and formulate problems in the field of studies; can collect, use and present subject matter, give advice and make professional evaluations

## Admission requirements

Applications are invited from individuals who have:

- A first degree (equivalent to 180 ECTS) from a recognised higher education institution (university, college, conservatoire) preferably in dance studies, anthropology, folklore, heritage studies or in related subjects (drama and/or theatre, music, sports and human movement studies, sociology, cultural studies) or equivalent professional experience.
- English Language qualification equivalent to the International English Language Testing System (IELTS) Level 6.5 in each band (Listening, Reading, Writing and Speaking).
- Two letters of recommendation supporting their application.
- Expertise in or understanding of dance or related movement practices (rituals, games, martial arts and physical theatre) which can be demonstrated through one or more of the following:
  - 1) A DVD or online film/video clip of no more than three minutes duration, showing their own dancing, choreography or other relevant performances or productions, or their teaching
  - 2) An essay of no more than three pages long, focusing either on the contextual and/or movement aspects of a dance or other related practice
  - 3) A relevant publication.

## Programme map and mobility of students

### Year 1- Semesters 1 & 2:

Students spend their first year of study either at NTNU Trondheim (Group A) or at UBP Clermont-Ferrand (Group B). They are divided between the two universities according to the desired supervision focus for their master's dissertation/thesis. This will be more practically oriented with a focus on dance practice and movement analysis at NTNU or more theoretically oriented with a focus on contextual analysis at UBP. All students will, however, be trained in both perspectives through the two first year intensive courses (see below Programme content), one held in each of the two universities.

### Year 1 – Semester 2:

In the beginning of the second semester students will have chosen the topic for their dissertation/thesis. They will undertake the necessary fieldwork during the period at the end of semester 2 and beginning of semester 3.

### Year 2 – Semester 3:

In the second academic year, all students go to SZTE Szeged for their third semester of the study. The focus here will be on the documentation and archiving of dance and other movement structures, with further training in movement analysis. Students will begin analysing their fieldwork data for their dissertation.

### Year 2 – Semester 4:

For the fourth and final semester of the programme, students will go to URL London. Courses will focus on anthropological analyses of dance in the contemporary context of post-colonialism, globalisation, transnationalism, and multiculturalism. Students will finalise the process of writing up their dissertation, which they shall submit by the end of July.

### Development and structure: Semester Breakdown

Below follows a semester breakdown of the structure of the Choreomundus Master's Programme for both study tracks:

#### Study option/Study track: Ethnochoreology:

Semester	30 ECTS Credits per semester
<b>4th semester Spring:</b> <b>Roehampton</b> <i>(joint courses across the two study tracks)</i>	<ul style="list-style-type: none"> <li>• <i>The Performance of Heritage: Dance in Museums, Galleries and Historic Sites</i> (10 ECTS)</li> <li>• <i>Extended Essay</i> (Dissertation 3) (10 ECTS)</li> <li>• One of following elective courses:               <ul style="list-style-type: none"> <li>○ <i>Dance in Culturally Diverse Societies</i> (10 ECTS)</li> <li>○ <i>Boundaries of the Body: Ritual, Dance and Performance</i> (10 ECTS)</li> </ul> </li> </ul>
<b>3rd semester Autumn:</b> <b>Szeged</b> <i>(joint courses across the two study tracks)</i>	<ul style="list-style-type: none"> <li>• <i>Dance Heritage, Individual Creativity</i> (5 ECTS)</li> <li>• <i>From Field to Archive</i> (5 ECTS)</li> <li>• <i>Research Methods</i> (Dissertation 2) (10 ECTS)</li> <li>• 10 ECTS elective courses *)</li> </ul>
<b>2nd semester Spring</b> <b>Blaise Pascal and NTNU</b>	<ul style="list-style-type: none"> <li>• <i>Critical Perspectives on Intangible Cultural Heritage</i> (Intensiv Programme 2 at UBP) (15 ECTS)</li> <li>• DANS3006 <i>Dance as Knowledge</i> (5 ECTS)</li> <li>• DANS3007 <i>Analysing Dance – Dissertation 1</i> (10 ECTS)</li> </ul>
<b>1st semester Autumn</b> <b>NTNU</b>	<ul style="list-style-type: none"> <li>• DANS3003 <i>Dance Analysis</i> (Intensive Programme 1 at NTNU) (15 ECTS)</li> <li>• DANS3005 <i>Field and archiving techniques</i> (15 ECTS)</li> </ul>
*) A list of courses will be announced prior to the beginning of the semester.	
<i>Joint courses across the two study tracks are highlighted in blue.</i>	

**Study option/Study track: Anthropology:**

<b>Semester</b>	<b>30 ECTS Credits per semester</b>
<b>4th semester Spring: Roehampton</b> <i>(joint courses across the two study tracks)</i>	<ul style="list-style-type: none"> <li>• <i>The Performance of Heritage: Dance in Museums, Galleries and Historic Sites (10 ECTS)</i></li> <li>• <i>Extended Essay (Dissertation 3) (10 ECTS)</i></li> <li>• One of following elective courses: <ul style="list-style-type: none"> <li>○ <i>Dance in Culturally Diverse Societies (10 ECTS)</i></li> <li>○ <i>Boundaries of the Body: Ritual, Dance and Performance (10 ECTS)</i></li> </ul> </li> </ul>
<b>3rd semester Autumn: Szeged</b> <i>(joint courses across the two study tracks)</i>	<ul style="list-style-type: none"> <li>• <i>Dance Heritage, Individual Creativity (5 ECTS)</i></li> <li>• <i>From Field to Archive (5 ECTS)</i></li> <li>• <i>Research Methods (Dissertation 2) (10 ECTS)</i></li> <li>• <i>10 ECTS elective courses *</i></li> </ul>
<b>2nd semester Spring Blaise Pascal</b>	<ul style="list-style-type: none"> <li>• <i>Critical Perspectives on Intangible Cultural Heritage (Intensive Programme 2 at UBP) (15 ECTS)</i></li> <li>• <i>Transmitting Dance as Embodied Culture, Knowledge and Experience (5 ECTS)</i></li> <li>• <i>Conceptual and Methodological Issues for Fieldwork (Dissertation 1) (10 ECTS)</i></li> </ul>
<b>1st semester Autumn NTNU and Blaise Pascal</b>	<ul style="list-style-type: none"> <li>• <i>DANS3003 Dance Analysis (Intensive Programme 1 at NTNU) (15 ECTS)</i></li> <li>• <i>Anthropological analyses of dance (10 ECTS)</i></li> <li>• <i>Ethnographic research methods: Fieldwork, interview and other techniques (5 ECTS)</i></li> </ul>
*) A list of courses will be announced prior to the beginning of the semester.	
<i>Joint courses across the two study tracks are highlighted in blue.</i>	

**More information**

More information is available on the web page of the programme: [www.choreomundus.org](http://www.choreomundus.org)

## **MASTER OF PHILOSOPHY (M.PHIL.) IN ENGLISH LINGUISTICS AND LANGUAGE ACQUISITION**

The department offers an international Master's programme: Master of Philosophy (abbreviated 'M. Phil.') in English Linguistics and Language Acquisition.

### **Learning Outcome**

This programme provides the basis for a career in public and private sector organisations where there is a demand for a high level of competence in the fields of English language and linguistics, language acquisition, or language and cognition, for example, expertise in how humans comprehend and use language in speech and writing.

The programme also provides the basis for further postgraduate education / doctoral research with a specialisation in language acquisition, language processing and/or English linguistics; or any career where analysis, development, text production and communication play an essential role.

### **Knowledge**

The candidates

- are familiar with theoretical concepts and frameworks, and methods involved in the study of language acquisition, language and cognition, language processing and English linguistics,
- are acquainted with central questions and past and current debates in the subject area, and can compare, contrast and evaluate different approaches,
- have acquired in-depth specialist knowledge from the writing of their master's thesis on a self-chosen topic within the fields of language acquisition, language processing, language and cognition and/or English language and linguistics.

### **Skills**

The candidates

- are able, using English, to apply an array of precise theoretical linguistic concepts in approaching and analysing a variety of different questions,
- are able to communicate in English, both orally and in writing, in formal and academic contexts using forms appropriate to the subject area,
- are able to identify relevant topics and questions within the subject area,
- know how to identify and locate source materials within the subject area, and are able to make critical use of these.

### **General competence**

The candidates

- are able to formulate productive research questions and to assess the suitability and validity of different methodologies,
- are able to plan and carry out a research project of substantial scope under supervision,
- are able to make use of a range of research tools in a research investigation,
- know how to apply ethical standards in research, for example standards concerning the use and citation of sources and the handling of data that has been collected,

- are able to work with, to create an overview of, and to identify the main points in, large amounts of text,
- are able to create and organise an extensive written document in accordance with specific guidelines and requirements.

### Admission/Entry requirements

The programme is open to Quota Programme applicants and to applicants with other sources of financing. Applicants should hold a B.A. or an equivalent degree in English or Linguistics with a sufficient background in topics related to English language or linguistics. Only candidates with a minimum of 20 ECTS in English language/linguistics courses will be considered for acceptance.

Successful applicants to the Master's programme must meet the minimum average grade requirement for admission, which is the grade C by the Norwegian grading scale, or equivalent approved minimum grade.

Officially certified copies of all educational certificates, including transcripts and diplomas from secondary school and university education, must be submitted.

An English proficiency test must be included. Applicants must pass either the TOEFL with a minimum score of 600/90 points on the paper based/internet based test, or the IELTS with a minimum score of band 6.5. Citizens of Ireland, the UK, the US, Canada, Australia and New Zealand do not have to submit TOEFL/IELTS test results. This is also the case for applicants who have spent at least one year in any of these countries, attending higher secondary school or university. Applicants from African countries with a B.A./B.Sc./B.Eng. degree where the language of instruction has been English and those who have passed English as a subject at GCE A-level with grade C or better are also exempted. Applicants with a university degree in English language (B.A. in English) are also exempted from the English language proficiency test requirement. Please be aware that applicants from Asian countries (for example Bangladesh, India, Nepal, Pakistan, Sri Lanka, Thailand, and Vietnam) with a B.A./B.Sc./B.Eng. degree where the language of instruction has been English are not exempted from the English language requirements, except for candidates holding a B.A. degree in English.

### Courses

Course code	Course title	ECTS credits	Semester	Restricted admission
ENG2153	First and Second Language Acquisition	7.5	Spring	
ENG2155	Theoretical Approaches to English Language	7.5	Autumn	
ENG3122	Cognitive and Theoretical Aspects of Language	15	Spring	
ENG3123	Translation	7.5	Spring	
ENG3510	Topics in Semantics	7.5	Autumn	
ENG3920	Master's Thesis in English Linguistics and Language Acquisition	60	Autumn and spring	Yes 1)
SPRÅK3000	Theories and Methods in Linguistics	15	Autumn	
1) Admission to the course requires admission to the M. Phil.-programme.				

### Programme components

The table below shows how a Master of Philosophy in English Linguistics and Language Acquisition is usually built up.

Semester	7.5 credits	7.5 credits	7.5 credits	7.5 credits
Spring 4	ENG3920 Master's Thesis in English Linguistics and Language Acquisition			
Autumn 3				
Spring 2	ENG3122 Cognitive and Theoretical Aspects of Language	ENG3123 Translation	ENG2153 First and Second Language Acquisition	
Autumn 1	SPRÅK3000 Theories and Methods in Linguistics	ENG3510 Topics in Semantics	ENG2155 Theoretical Approaches to English Language	

The range of topics that could be offered in the programme includes advanced topics in modern English syntax, studies of the lexicon, first language acquisition and second language acquisition studies, translation theory and communication studies.

Students who wish to include other courses offered by the department, should contact the department for further information regarding the possibilities for an individual curriculum.

The department offers supervision in the syntax/semantics of modern English, first and second language acquisition, the syntax/semantics interface and theories on contemporary information structure.

In their second semester in the programme, students should choose a topic for their Master's thesis. A supervisor will be appointed for each student based on his or her choice of topic. By the end of the second semester, students have to submit a project proposal for their Master's thesis. The project proposal must be approved by the department.

After the first year of studies, during the period mid-June to mid-August, candidates are given the opportunity to go back to their home countries to do field-work if this is necessary for the completion of their thesis. Students who are supported by the Quota Programme are awarded an extra grant to cover field-trip expenses.



## **MASTER OF PHILOSOPHY (M. PHIL.) IN LINGUISTICS: THEORETICAL, DESCRIPTIVE AND DIGITAL APPROACHES**

This degree is also known as the 'International M. Phil in Linguistics'.

### **Admission requirements**

Applicants should hold a B.A. or equivalent degree in Linguistics or an equivalent degree with a sufficient emphasis on topics related to Linguistics. Only candidates with a minimum of three Linguistics courses will be considered.

Applicants to the Master's programme must meet the minimum average grade requirement for admission, which is the grade C by the Norwegian grading scale, or equivalent approved minimum grade

Officially certified copies of all educational certificates, including transcripts and diplomas from secondary school and university education, must be submitted.

An English proficiency test result must be included. Applicants must pass either the TOEFL with a minimum paper score of 550 (230 computer) or the IELTS with a mark of 6.0 or better. Citizens of Ireland, the UK, the US, Canada, Australia and New Zealand do not have to submit TOEFL/IELTS test results. This is also the case for applicants who have spent at least one year in one of these countries, and who have attended higher secondary school or university there. Applicants from African countries with a BA/BSc/BEng degree for which the language of instruction has been English, and those who have passed English as a subject at GCE A-level with grade C or better, are also exempted from the language requirement. Applicants with a university degree in English language (BA in English) are also exempted from the language requirement. Please be aware that applicants from Asian countries (for example Bangladesh, India, Nepal, Pakistan, Sri Lanka, Thailand, and Vietnam) with a BA/BSc/BEng degree for which the language of instruction has been English are **not** exempted from the English language requirement, except for candidates holding a BA degree in English.

**NB! The Programme is also open to non-quota programme applicants.**

### **Course outline**

The M.Phil. Programme requires two years of full-time study, and starts in the autumn term. The ECTS credits are divided between courses comprising of a total of 75 ECTS credits, and a thesis of 45 ECTS credits. 60 ECTS credits represent the normal workload for a full-time student for one academic year. LING2211, LING 3304 and LING3305 are compulsory courses. The other courses may include both intermediate courses (LING2xxx courses) and master's courses (LING3xxx courses) of the candidate's choice from the first table below, in addition to maximum one of the interdisciplinary topics listed in the second table below. At least 45 ECTS credits must have a course code LING3xxx (master's level). The courses are selected from those offered to regular students in Linguistics. It is expected that the second semester of the second year shall be devoted exclusively to work on the master's thesis.

### Topics offered in the programme

The range of topics that may be offered represents a subset of the topics offered in the regular Bachelor's and Master's Programmes in Linguistics, namely:

Course code	Course title	ECTS credits	Semester	Restricted admission
LING2208	Digital methods for speech and text processing	15	Spring	
LING2211	Semantics and Syntax	15	Autumn 1)	
LING3000	Chosen Topic	7,5	Spring	
LING3304	Phonology	7,5	Autumn 1)	
LING3305	Pragmatics	7,5	Autumn 1)	
LING3302	Master's Course in Syntax and Semantics	15	Autumn	
LING3308	Master's Course in Phonology	7,5	Spring	
LING3309	Master's Course in Pragmatics	7,5	Spring	
LING3392	M. Phil. Thesis in Linguistics	45	Autumn and Spring	Yes 2)

1) Compulsory courses in the M. Phil in Linguistics.

2) LING3392: Requires admission to the programme of study Master of Philosophy in Linguistics.

### Interdisciplinary topics

The following courses are approved in an M.Phil. in Linguistics. Maximum *one* of the following courses may be admitted in the degree. More information about the courses is to be found in the course descriptions in the respective curricula.

Course code	Course title	ECTS credits	Semester	Restricted admission
FON1101	Introduction to Phonetics	15	Autumn	
ENG2153	First and Second Language Acquisition	7,5	Spring	
ENG3122	Cognitive and Theoretical Aspects of Language	15	Spring	
TDT4275	Natural Language Interface	7,5	Spring	

**M.Phil. in Linguistics:**

The table below shows how an M. Phil. in Linguistics can be built up.

<b>Semester</b>	<b>7,5 credits</b>	<b>7,5 credits</b>	<b>7,5 credits</b>	<b>7,5 credits</b>
<b>Spring 4</b>	LING3392 M. Phil. Thesis			
<b>Autumn 3</b>	LING3392 M. Phil. Thesis		LING3302 Master's Course in Syntax and Semantics	
<b>Spring 2</b>	LING2208 Digital Methods for speech and text processing		LING3308 Master's Course in Phonology	and LING3309 Master's Course in Pragmatics
<b>Autumn 1</b>	LING2211 Semantics and Syntax		LING3304 Phonology	LING3305 Pragmatics

## MASTER OF PHILOSOPHY IN CHILDHOOD STUDIES

Approved by the Board at NTNU 30.08.2005, with changes made by the Faculty of Social Sciences and Technology Management 14.12.2012

### INTRODUCTION

The Norwegian Centre for Child Research (NOSEB) offers an interdisciplinary, international master's programme in Childhood Studies. The degree is awarded by the Faculty of Social Sciences and Technology Management at NTNU and administered by NOSEB. The master's programme offers an advanced education in interdisciplinary social studies of children and childhood.

### Aim of the programme

The programme aims at providing the student with:

- Knowledge and perspectives regarding contemporary debates in childhood studies.
- Knowledge on how childhoods and children's lives vary and are shaped by historical, social, cultural, political, economic and everyday life contexts.
- Knowledge on international and regional conventions on children's rights and how they might be used to improve children's well-being.
- Skills to carry out independent research on children's lives and on childhood as a social phenomenon.
- The skill of promoting children's views and perspectives in public services.

In addition, the programme aims at providing the student with the following general competencies:

- Practical training in various steps of planning and carrying out project work and research on children's lives in different settings and in a global context.
- Skills in working in national and international organizations where multicultural work environment is a norm.
- Academic communication skills (writing and verbal) and reflexivity in contexts in which several parties are involved.

Furthermore, a main focus of the programme is to generate knowledge about childhood, children's life-worlds, and the politics of childhood in changing societies. The programme will give a broad introduction to different theoretical and methodological perspectives and key concepts in contemporary social and historical research on children and childhood. The central issue is childhood and related themes such as generation, gender, class, identity and ethnicity, as these take form through varying processes like globalisation, institutionalisation, consumption and commercialisation.

The master's programme is theoretically and methodologically related to interdisciplinary social studies of childhood. A child perspective, including participatory approaches and conducting research with children, represents a main integrative approach. The UN Convention on the Rights of the Child (CRC) is discussed as a tool to promote children's well-being worldwide. Important topics are children as participants in play, education, child labour, community building, and the social, political and economic reproduction of society in general. CRC can be seen as part of globalisation processes, producing particular images of what it means to be a child. An important aim is to encourage comprehensive insights in and an understanding of how the globalised conditions under which children grow up affect 'local' and 'national' childhoods in both the global North and the global South. The ways in which children themselves explore and experience their everyday lives and childhoods are also explored.

## Employment opportunities

The MPhil in Childhood Studies qualifies for work related to research, teaching, supervision and consultancy in the fields of children, welfare and social development. The master's programme will be relevant for building a career related to children and childhood in different public sectors in governmental organisations. This may include policy and planning for children's living conditions in ministries and institutions which concern children, both locally and internationally. Another important area is non-governmental organisations (NGOs), such as Save the Children and the Red Cross.

## ADMISSION REQUIREMENTS

The master's programme accepts students financed by the Quota Programme, Norwegian/Nordic students, as well as international students with individual funding. The total number of admitted students is 20-25 per year.

Admittance to the programme requires a bachelor's degree in the social sciences or humanities, or other equivalent education. The average grade of the degree must be at least C by the Norwegian grading system, or equivalent, as decided by NTNU. A background in childhood studies, social anthropology, geography, sociology or history is recommended.

The language of instruction is English, and applicants must document their English proficiency by achieving a passing grade from a Norwegian upper secondary school (videregående skole) or through a standardized test (TOEFL 600/90 paper-based/internet-based or IELTS with 6.5 or better). Applicants may document their English proficiency in other ways, and students from some countries may be exempted from documenting their competence in English as described above. For more information, please contact the Office of International Relations or consult the following website:

[www.ntnu.edu/studies/imp/admissions](http://www.ntnu.edu/studies/imp/admissions).

## OUTLINE OF THE MPhil IN CHILDHOOD STUDIES

Semester	Course (7,5 cr)	Course (7,5 cr)	Course (7,5 cr)	Course (7,5 cr)
4th sem/spring	BARN3900 Master's Thesis (60 cr)			
3rd sem/autumn				
2nd sem/spring	BARN3102 Children's Rights (7,5 cr)	BARN3201 Methods and Ethics in Child and Childhood Research (7,5 cr)	Experts in Teamwork (7,5 cr)	BARN3400 Preparatory Course, Master's Thesis (7,5 cr)
1st sem/autumn	BARN3101 Social Studies of Children and Childhood (7,5 cr)	BARN3202 Methodological Perspectives on Child and Childhood Research (7,5 cr)	BARN3300 Children and Development in the Global South (7,5 cr)	Elective (7,5 cr)

The master's programme in Childhood Studies involves two years of full-time study. The normal workload for a full-time student for one academic year is 60 credits. Most of the courses during both years have minimum 80% compulsory attendance. The programme is structured around a combination of core courses (52.5 credits) and elective courses (7.5 credits), which provide a general introduction to theory and methodology, as well as giving students the opportunity to specialize in particular topics. In addition, the programme includes a master's thesis (60 credits).

### Core courses

Code	Title	Credits	Term	Admission
BARN3101	Social Studies of Children and Childhood	7,5	Autumn	Open
BARN3102	Children's Rights	7,5	Spring	Open
BARN3201	Methods and Ethics in Child and Childhood Research	7,5	Spring	Open
BARN3202	Methodological Perspectives on Child and Childhood Research	7,5	Autumn	Open
BARN3300	Children and Development in the Global South	7,5	Autumn	Open
BARN3400*	Preparatory Course, Master's Thesis	7,5	Spring	Admission to programme
EiT	Experts in Teamwork	7,5	Spring	Restricted admission
BARN3900*	Master's Thesis	60	Autumn/ Spring	Admission to programme

\* Requires admission to MPhil in Childhood Studies. Exception: BARN3400 is open for exchange students from the MA Children, Youth and International Development, Brunel University.

### Elective courses

Code	Title	Credits	Term	Admission
BARN3610*	Anthropology of Early Childhood	7,5	Autumn	Open
GEOG3006*	Quantitative Methods	7,5	Spring	Open
GEOG3515*	Environment, Development and Changing Rural Livelihoods	7,5	Autumn	Open
GEOG3516*	Humanitarianism: Theory and Practice	7,5	Autumn	Open
GEOG3522*	Migration and Development	7,5	Spring	Open
PED3520*	Democracy and Education: Perspectives in Educational Sociology	7,5	Autumn	Open
SANT3508*	Globalization Theory and Culture	7,5	Spring	Open

\* For up-to-date information about which courses are running, please contact NOSEB, the Department of Geography (GEOG courses), the Department of Education (PED3520) and the Department of Social Anthropology (SANT3508).

### Experts in Teamwork (EiT)

Experts in Teamwork will be taught as an intensive village in this master's programme.

### Master's thesis agreement

All students must sign a master's thesis agreement that regulates the relationship between student and supervisor, among other things.

### Social and academic arrangements for students

At the beginning of the first semester, a common ground between students and teachers will be established. Through social and academic arrangements everyone will have the opportunity to get to know one another. Both students and teachers are encouraged to share experiences from their own childhoods and/or childhoods in their 'home country', and basic theoretical perspectives within Childhood Studies will be introduced and discussed.

## PHD

MPhil in Childhood Studies qualifies for the PhD Programme in Interdisciplinary Child Research, as well as several other PhD Programmes within the social sciences.

## COURSE DESCRIPTIONS

Please note: Information about credit adjustments due to overlap in content between courses must be checked by consulting the table on the last page of this study plan or NTNU's webpages: [www.ntnu.no/studier/emnesok](http://www.ntnu.no/studier/emnesok)

### BARN3101 Social Studies of Children and Childhood

**Teaching:** Autumn: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Attending lectures is compulsory (minimum 80%)

**Recommended previous knowledge:** See required previous knowledge.

**Required previous knowledge:** Admittance to the course requires a bachelor's degree in a social science or humanities discipline, or equivalent.

**Learning objectives:** This course aims to introduce students to theoretical perspectives, concepts and ongoing debates in social studies of children and childhood, as well as to how children's everyday lives and welfare and the politics of childhood vary across time and space.

By the end of the course participants will have gained knowledge and understanding of:

- The interdisciplinary social studies of children and childhood, the historical background, concepts and contemporary perspectives, and debates on and critique of the approach.
- Childhood as a social, cultural and historical phenomenon, children's everyday lives and well-being related to cultural and societal circumstances as well as politics of childhood in changing societies.

**Academic content:** Framed by social studies of children and childhood, the course addresses theoretical perspectives on child and childhood research as these have unfolded both historically and still today in contemporary societies. This includes, among others, the adoption of a developmental approach, as well as viewing childhood as socially constructed. The course addresses issues at a structural level, that have implications for children's everyday lives and childhood, as well as children's active contribution and agency in defining and giving meaning to their lives, activities and relations. Central issues to explore in this course are images and understandings of children and childhood, generational relations, culture, gender, identity, ethnicity, children's lived experiences in relation to peer activities and adult organization, and their expectations in and outside educational institutions. The course also addresses childhood as a social phenomenon and shows how children are both shaped by and themselves shape their childhood experiences within diverse societal and daily life conditions, practices, power and generational relations.

**Course materials:** Information will be given at the beginning of the semester.

**Teaching methods and activities:** Total lecture hours: ca. 20 hours.

**Assessment:** Written examination

Forms of assessment	Time	Percentage	Deadline
Written examination	4 Hours		

## **BARN3102 Children's Rights**

**Teaching:** Spring: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Oral presentation. Attending lectures and seminar is compulsory (minimum 80%).

**Recommended previous knowledge:** It is an advantage to have read the UNCRC convention and being familiar with the legal language in the document.

**Required previous knowledge:** Admittance to the course requires a bachelor's degree in a social science or humanities discipline, or equivalent.

**Learning objectives:** The main objectives of the course are to provide students with knowledge of:

- Global discourses on the UN Convention on the Rights of the Child (CRC): theoretical debates and judicial principles.
- Regional conventions on children's rights (e.g. the African charter on the rights of the child).
- Rights discourses as a tool to improve children's life conditions and well-being in different parts of the world.
- The dynamic relationship between rights discourses as part of globalisation processes and children's lives in all parts of the world.

**Academic content:** The course provides students with an overview of different declarations on children's rights in a historical perspective. They learn how to discuss the UN Convention on the Rights of the Child and its implications for children's lives in different parts of the world. The students will learn to explore children's lives and welfare in light of changing policies and processes of globalization. The students acquire knowledge about the principle of the 'best interest of the child' and children's rights to provision, protection and participation. Among additional topics to be addressed are emerging issues on the rights of minority-group children (e.g. the rights of street children, the rights of refugee children etc.), children as social participants in the economic, social and cultural reproduction of society, the role of NGOs in the implementation of the UN Convention on the Rights of the Child, assessments of national reports on children's rights, migration and ethnicity, etc. Through nuanced discussion, the course also provides students with knowledge about the competing discourses on children as autonomous beings or as dependent social beings.

**Course materials:** Information will be given at the beginning of the semester.

**Teaching methods and activities:** Total lecture hours: ca. 18 hours, total seminar hours: up to 12 hours. The course consists of: (1) a common introduction with lectures; (2) a seminar with presentation and discussion of the individual students' term papers. Each student will be required to comment on another student's term paper.

**Assessment:** Assignment

Forms of assessment	Time	Percentage	Deadline
Assignment			

## **BARN3201 Methods and Ethics in Child and Childhood Research**

**Teaching:** Spring: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade



**Compulsory assignments:** Compulsory attendance in all the training workshop days. Attending lectures is also compulsory (minimum 80%).

**Recommended previous knowledge:** See required previous knowledge.

**Required previous knowledge:** Admittance to the course requires a bachelor's degree in a social science or humanities discipline, or equivalent.

**Learning objectives:**

- To familiarize students with a range of participatory, child-focused methods and ethics.
- To enable students design and carry out independent research with children in diverse settings and contexts.
- To provide students with training in critically evaluating current scholarships on the social, moral, ethical and practical challenges of undertaking scientific research with children and young people.

**Academic content:** The course focuses on research tools, techniques and ethics, rather than methodology. It takes its points of departure on the idea that children are social actors with agency, who create and use meanings and are subjects of human rights. It follows that they have the right to be properly researched, enabled to share their views and experiences through methods that are both scientific and ethical. The course is practical and experiential - students will practice how to design and use a variety of research methods that should be useful for data collection in their own MPhil research projects.

**Course materials:** Information will be given at the beginning of the semester.

**Teaching methods and activities:** The course begins with an introductory lecture on perspectives and principles related to scientific and ethical research with children and young people. This is accompanied by a week-long training workshop that involves hands-on experience on engaging children and young people in different stages of the research process. The training workshop draws on a manual for participatory approaches and gives students the opportunity to develop a repertoire of methods and ethical strategy by means of concrete examples, as well as plenary and group discussions. Additional lectures will be given by lecturers undertaking empirical studies with children in different parts of the world in order to exemplify the diversity and complexity of child-focused methods and ethics. Students will have to write a term paper that is related to their master's thesis, carefully applying the reading list and knowledge they acquired from the course.

**Assessment:** Assignment

Forms of assessment	Time	Percentage	Deadline
Assignment			

## **BARN3202 Methodological Perspectives on Child and Childhood Research**

**Teaching:** Autumn: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Approved working paper and oral presentation. Attending lectures and seminar is compulsory (minimum 80%).

**Recommended previous knowledge:** See required previous knowledge.

**Required previous knowledge:** Admittance to the course requires a bachelor's degree in a social science or humanities discipline, or equivalent.

**Learning objectives:** The course aims to present theory that informs different methods and techniques in child and childhood research and develop students' ability to reflect critically on the relationship between the purpose of a study and the theoretical and the methodological choices that arise throughout a research process. The course also aims to offer students the possibility to write brief academic texts.

By the end of the course participants will have gained an understanding of:

- Theory of science: knowledge about different research paradigms, and theoretical perspectives related to empirical research on children and childhood as a social phenomenon and interpretive methodologies.
- Reflexivity: through empirical examples, student activities and discussions, to reflect upon the relationship between overall scientific principles, perspectives and debates, as well as on issues to consider when preparing a research plan.
- Academic writing: knowledge about expectations regarding an academic text through lectures, individual writing and group discussions.

**Academic content:** The course will provide an overview of different scientific paradigms and perspectives, focus specifically on ethnographic approaches and discuss how a focus on children as subjects in research influences the various steps in a research process, such as formulating a research question, preparing an empirical inquiry, obtaining access to the field, ethics, collecting data, analysis and interpretation of data, and drawing up a research text. This approach and content aim to develop students' reflexivity and qualify them to make informed decisions when planning an inquiry.

**Course materials:** Information will be given at the beginning of the semester.

**Teaching methods and activities:** Total lecture hours: ca. 20 hours, total seminar hours: up to 12 hours, with presentation and discussion of individual students' working papers. The time allocated for seminars will be organized in 3-4 seminars during the semester, and each student will be required to comment on another student's working paper.

**Assessment:** Written examination

Forms of assessment	Time	Percentage	Deadline
Written examination	4 Hours		

## **BARN3300 Children and Development in the Global South**

**Teaching:** Autumn: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Approved term paper. Attending lectures is compulsory (minimum 80%).

**Recommended previous knowledge:** See required previous knowledge.

**Required previous knowledge:** Admittance to the course requires a bachelor's degree in a social science or humanities discipline, or equivalent.

**Learning objectives:**

- To familiarize students with how children in diverse social, economic, cultural and political contexts of the global South fare in their lives.
- To provide students with an interdisciplinary understanding of the complex interrelationship between development processes and young people's everyday lives.
- To provide students with skills in critically evaluating current research and scholarship in the field of children and socio-economic and cultural change.

**Academic content:** The course provides opportunities for students to develop systematic knowledge on how young people are impacted by and respond to various development processes (e.g. national and global policies, structural adjustment programs, international trade and treaties). Specific topics covered include an overview of development theories and childhood theories; young people and socio-cultural change; the meanings and values of children; interventions for children in difficult circumstances (e.g. street children, refugee children);

child labour/children's work; education for boys and girls; children, migration and social change; childhood poverty; impacts of HIV/AIDS on children; politics of orphanhood; children and armed conflicts; youth, participation and political activism.

**Course materials:** Information will be given at the beginning of the semester.

**Teaching methods and activities:** Total lecture hours: ca. 20 hours. The course begins with a series of lectures that draws on a selected reading list that constitutes a compendium. Students are required to write a term paper on a topic related to the content of the course. The term paper is not graded but it needs to be submitted and approved before students can qualify to sit for the final written examination.

**Assessment:** Written examination

Forms of assessment	Time	Percentage	Deadline
Written examination	4 Hours		

### **BARN3400 Preparatory Course, Master's Thesis**

**Teaching:** Spring: 7.5 Cr

**Language of instruction:** English

**Grade:** Pass/Fail

**Compulsory assignments:** Attending seminar is compulsory (minimum 80%).

**Recommended previous knowledge:** See required previous knowledge.

**Required previous knowledge:** Admittance to the course requires a bachelor's degree in a social science or humanities discipline, or equivalent. The course is reserved for students admitted to MPhil in Childhood Studies, with one exception: Exchange students from the MA Children, Youth and International Development, Brunel University.

**Learning objectives:** To provide students with basic knowledge to prepare and design scientific research projects. The students will develop a research design, including an empirical study, which will then form the basis for the master's thesis.

**Academic content:** The course will draw on BARN3201, and prepare the students for their work with the master's thesis. The various stages of the research process will be discussed, such as defining a research problem, how to make use of acquired knowledge of theory and methodology, analysis etc. During the course the students will develop a master's project. Each student's project will be discussed in plenum. By the end of the course, a final project description must be submitted.

**Course materials:** Information will be given at the beginning of the semester.

**Teaching methods and activities:** Total seminar hours: ca. 18 hours. Form of assessment: approved oral presentation and project description.

**Assessment:** Oral examination/Report

Forms of assessment	Time	Percentage	Deadline
Oral examination		1/2	
Approved report		1/2	

### **BARN3900 Master's Thesis**

**Teaching:** 1st sem. autumn, 2nd sem. spring: 60.0 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Empirical study, participation in Master's Thesis Seminar (minimum 80%), submission of chapter drafts, individual supervision.

**Recommended previous knowledge:** See required previous knowledge.

**Required previous knowledge:** Admittance to the course requires a bachelor's degree in a social science or humanities discipline, or equivalent. The course is reserved for students admitted to MPhil in Childhood Studies.

**Learning objectives:** To provide students with training in carrying out a scientific study related to children and childhood. The Master's Thesis Seminar in particular will focus on academic writing and present the expectations to an academic text.

**Academic content:** Students will select a topic for the master's thesis, which must be an autonomous, scientific study based on concrete research questions related to children and childhood. The thesis should be 80-120 pages (Times New Roman 12, space 1.5).

Normally, the thesis must include an empirical study. Data collection should be completed by the middle of the 3rd semester (medio October). The students are recommended to use the summer between the 2nd and 3rd semester for data collection, if possible.

The thesis is expected to be completed within four semesters from admission to the programme. Supervision will not be provided beyond this time.

**Course materials:** Information will be given at the beginning of the semester.

**Teaching methods and activities:** The students will take part in a Master's Thesis Seminar with emphasis on theoretical and practical issues related to the writing of a master's thesis. All students will present their thesis work at the seminar. The students are also expected to hand in chapter drafts throughout their writing period, and they will be given individual supervision. All students must sign a master's thesis agreement that regulates the relationship between student and supervisor, among other things. Forms of assessment: Master's thesis and oral exam. The oral exam is used to adjust the grade given for the thesis.

**Assessment:** Thesis

Forms of assessment	Time	Percentage	Deadline
Thesis			

## **BARN3610 Anthropology of Early Childhood**

**Teaching:** Autumn: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Approved working paper and oral presentation.

**Recommended previous knowledge:** See required previous knowledge.

**Required previous knowledge:** Admittance to the course requires a bachelor's degree in a social science or humanities discipline, or equivalent.

**Learning objectives:** The main objective of this study is to provide students with a broad knowledge on early childhood in a cross-cultural and comparative perspective. Among the topics discussed are:

- Early childhood, family life and child rearing practices.
- Early childhood education and care; a culture-sensitive approach.
- Development, health and wellbeing.
- Play, oral tradition and aesthetical expressions.
- Young children and spirituality in a cross-cultural perspective, including religious and ritual practices.

**Academic content:** The course provides opportunities for students to explore the multiplicities of early childhood, promoting an understanding of early childhood as a social and cultural construction, and therefore specific to time and place. As part of this, the study will focus on the enormous cultural diversity in children's lived experiences, as well as on how local

categories, notions, and values may influence parents and community members' perceptions and choices with respect to the caretaking of young children. The course will enable students to question some assumptions to what are "normal" and "natural" ways to see and understand young children. The course mainly covers studies from anthropological, qualitative research traditions.

**Course materials:** Information will be given at the beginning of the semester.

**Teaching methods and activities:** Total lecture hours: ca. 20 hours, total seminar hours: up to 12 hours. The course consists of: (1) A common introduction with lectures. (2) A seminar with presentation and discussion of the individual students' working papers. Students may choose between writing a working paper individually, or together with 1-2 fellow students. Each student will be required to comment on another student's working paper.

**Assessment:** Written examination

Forms of assessment	Time	Percentage	Deadline
Written examination	6 Hours		

Department of Geography

## **GEOG3006 Quantitative Methods**

**Teaching:** Spring: 7.5 Cr

**Language of instruction:** English

**Grade:** Pass/Fail

**Compulsory assignments:** Seminar presentation, group assignment and individual assignments.

**Recommended previous knowledge:** See required previous knowledge.

**Required previous knowledge:** GEOG3003. Other relevant qualifications may be accepted by the Department of Geography. The course is optional /elective for those on the 5-year teacher training programme in Geography (master).

**Learning objectives:** The course gives the students deeper insight in the use of questionnaires and application of selected quantitative methods. Students should be able to apply these methods and techniques, overview their possibilities and limitations and give an adequate interpretation of the (analytical) results in their master thesis.

**Academic content:** The course pursues methodologies into a quantitative array of research schemes. It comprises four parts. (1) The course starts with lectures on questionnaire, (2) followed by group work on construction and presentation of a pilot questionnaire. Part 3 comprises lectures and exercises based on the use of a statistical software package (SPSS) for analysis of data. The main focus will be on statistical analyses of available data (database), however entering questionnaire data with further analyses may be an option. A research design comprising correlation and regression will be presented, as will other analytical techniques based on the students specific needs. In part 4, students will prepare an assignment in which they reflect on their choice of specific and appropriate methods and techniques directly related to their master thesis.

**Teaching methods and activities:** Lectures: 10 hours, seminars: 10 hours, exercises: 8 hours. Students must choose either GEOG3005 or GEOG3006. It is expected that compulsorys and examinations must be completed in English. Exceptions must be clarified with the lecturer responsible for the course.

**Assessment:** Oral examination

Forms of assessment	Time	Percentage	Deadline
Oral examination			

## **GEOG3515 Environment, Development and Changing Rural Livelihoods**

**Teaching:** Autumn: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Groupwork and presentation

**Required previous knowledge:** Bachelor in social science. Other relevant qualifications can be accepted upon approval by the Department of Geography.

**Learning objectives:** After the course the students should have an in-depth understanding of the links between development, environmental change and (rural) livelihood in African and Asian societies. Through the presentations the students should demonstrate ability to summarize and present findings from advanced research articles.

**Academic content:** Among the topics covered by the course: \*History of geographical thought: From environmental determinism to political ecology. \*Social nature; Social constructivism and environmental narratives. \*Institutions, norms and collective action and the idea of the 'community' as basis for natural resource management. \*Hazards and vulnerability. Vulnerability; a useful concept or just another way of labelling?: Vulnerability analysis in practice. \*Environmental conservation and development; from 'Fortress conservation' to 'Conservation and development'? \*Changing rural livelihoods and livelihood analysis; from farm to non-farm and implications for the rural environments. \*Environment and conflicts. The 'Environment' as basis for conflicts.

**Teaching methods and activities:** Lectures: 14 hours. Groupwork and presentations (obligatory). It is expected that compulsories and examinations must be completed in English. Exceptions must be clarified with the lecturer responsible for the course. Please note that the course may be cancelled due to the teaching capacity at the Department of Geography if less than 5 students register for the course. Check [www.ntnu.no/geografi/studentinformasjon](http://www.ntnu.no/geografi/studentinformasjon) for updated information.

**Assessment:** Written examination

Forms of assessment	Time	Percentage	Deadline
Written examination	4 Hours		

## **GEOG3516 Humanitarianism: Theory and Practice**

**Teaching:** Autumn: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** 2 assignments, compulsory attendance on the introduction day

**Recommended previous knowledge:** The course is given at master's level, a background equivalent to Bachelor in social sciences or extensive field experiences is therefore recommended.

**Learning objectives:** On completion students should be able to show a critical understanding of:

- The humanitarian system, its principles, actors, motivations and practices
- The outcomes of humanitarian crises for individuals and different groups of people
- The global governance of assistance in humanitarian emergencies
- How to develop an understanding of local contexts and local capacities in managing a humanitarian crisis
- The processes from relief to recovery during and after a humanitarian crisis

- The dilemmas between theory and practice

**Academic content:** Embedded in humanitarian action are a number of contentious issues regarding the relationships between political aims of donors and host governments and the people concerned. The course will stress the relationship between theory and practice and how to deal with operational dilemmas on the ground. The lectures will introduce principles and theories of humanitarian action; the various actors involved; the relationship between them and their motivations; the emergence of humanitarian regimes; the relationship between political development and humanitarian practice; humanitarianism and forced migration; gender, ethnicity and humanitarian challenges; ethical dilemmas, aid conditionality and the Do No Harm and Relief to Development concepts. The lectures are internet based with one day compulsory introductory seminar. For the students present at NTNU some seminars relating to the internet based lectures will be held. Assignments are approved/not approved.

**Teaching methods and activities:** Internet based, 1-day compulsory introductory seminar, altogether equivalent to 16 hours lectures. There will be additional seminars for the students present at NTNU. It is expected that compulsories and examinations must be completed in English. Exceptions must be clarified with the lecturer responsible for the course. Please note that the course may be cancelled due to the teaching capacity at the Department of Geography if less than 5 students register for the course. Check [www.ntnu.no/geografi/studentinformasjon](http://www.ntnu.no/geografi/studentinformasjon) for updated information.

**Assessment:** Home examination

Forms of assessment	Time	Percentage	Deadline
Home examination			

## **GEOG3522 Migration and Development**

**Teaching:** Spring: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Approved group work and seminar presentation

**Learning objectives:** On completion of this course students should be able to show a critical understanding of:

- National, regional and global patterns of migration with special reference to the Global South
- Causes, motivations and strategies for internal and international migration
- Theoretical perspectives on migration
- The relationships between different understandings and perspectives of migration and development
- Forced and voluntary migration and the relationships between them
- Ways and principles for studying migration and development
- Governance of migration
- Migration as a development strategy

**Academic content:** The course discusses internal and international migration processes in a development context. In particular the course concentrates on understanding the relationship between migration and development by offering theoretical insights into how to conceptualise migration and how development theories have understood the role of migration in development. The course aims to provide analytical approaches for understanding the migration process by introducing debates on causes, practices, migration regimes and policies, as well as the development impacts of internal and international migration. Methodological ap-

proaches for researching migration and development will be introduced.

**Teaching methods and activities:** 16 hours lectures, 10 hours group work and presentation (depending on the number of students). Teaching methods include films, discussions and presentations. It is expected that compulsories and examinations must be completed in English. Exceptions must be clarified with the lecturer responsible for the course. Please note that the course may be cancelled due to the teaching capacity at the Department of Geography if less than 5 students register for the course. Check [www.ntnu.no/geografi/studentinformasjon](http://www.ntnu.no/geografi/studentinformasjon) for updated information.

**Assessment:** Written examination

Forms of assessment	Time	Percentage	Deadline
Written examination	4 Hours		

Department of Education

## **PED3520 Democracy and Education: Perspectives in Educational Sociology**

**Teaching:** Autumn: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Contribution in one seminar or compulsory written assignment (4-6 pages).

**Required previous knowledge:** A bachelor's degree in one of the social sciences or humanities.

**Learning objectives:** The course renders knowledge about and theoretical perspectives on:

- Theoretical insights into the relationship between pedagogic interactions and contextual conditions.
- Understanding of the relations between formal, informal and non-formal education.
- How pedagogic practices contribute to change in contextual conditions at a macro level.
- How pedagogic practices reproduce contextual conditions at a macro level.

**Academic content:** Micro interactions in pedagogical practices will highlight the preferred contents, methods and organizational or institutional characteristics within pedagogic practices. Pedagogic practices in formal, informal and non-formal education will also be considered. Micro pedagogic practices are embedded in contextual conditions at a macro level of specific social, political, economic and cultural realities and trends. These macro conditions are in constant interplay with micro realities making change possible both on the micro as well as the macro levels. This change will be partly influenced by the degree of participation and marginalization occurring in pedagogical practices ranging from reproduction of dominant contents to conscientization and praxis fundamental to participative democracy.

**Course materials:** The required course reading material is on approximately 500 pages.

**Teaching methods and activities:** 2 hours of lectures per week, 1 hour of seminar per week. Teaching may be concentrated in specific periods during the term. Compulsory activity: Contribution in one seminar or written assignment (4-6 pages). The written assignments limited to the extent of maximum 15 pages (Times New Roman 12pt., line spacing 1.5). The responsible course coordinator determines whether the subject of the assignment is a) optional or b) bound to a limited set of issues. Arrangements are made for an ongoing interaction between lectures, seminars and the student's development of the project topic. The topic, research question must be approved by the responsible course coordinator before 1st of November. Deadline for submission is 10th of December. If less than 10 students sign up for the course it may be cancelled.

**Assessment:** Assignment



Forms of assessment	Time	Percentage	Deadline
Assignment			

Department of Social Anthropology

## **SANT3508 Globalization Theory and Culture**

**Teaching:** Spring: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Written assignment

**Required previous knowledge:** 60 ECTS in Social Anthropology or a bachelor's degree or equivalent.

**Learning objectives:** The candidate has attained

- a broad understanding of the key concepts of globalization theory
- knowledge of various theories of globalization processes
- insight into recent research pertaining to globalization processes

**Skills:**

The candidate has acquired skills to

- assess the implications of globalization for people's everyday life
- analyze the construction of meaning, identity and subjectivity in a globalized world
- analyze the construction of new social imaginaries and cultural repertoires in a globalized world

**Academic content:** Globalization is the buzzword of the 21st century. If we live in a globalized world, what does this mean for our economics, our culture, our work and leisure, even our sense of ourselves? The course offers a survey of the major theories and debates of globalization. The course examines in addition the social and cultural aspects of globalization processes. Globalization processes refers to the intensification of global interconnectedness which entails increased standardization, homogenization and universalization as Western ideologies circulate more widely. Accommodating unifying and standardizing and universalizing impulses, however, we also find more heterogeneous, particular and local expressions, hybridization, creolization and forms of resistance. The deterritorialization of culture and the global flow of commodities, advertising and media give rise to new premises for the construction of meaning, identity and subjectivity, along with new social imaginaries and cultural repertoires.

**Course materials:** See reading list available at the beginning of the semester.

**Assessment:** Written examination

Forms of assessment	Time	Percentage	Deadline
Written examination	4 Hours		

**CREDIT ADJUSTMENTS DUE TO OVERLAP IN CONTENT**

<b>Course</b>	<b>Course</b>	<b>Credits</b>
BARN3100	BARN3101	7,5 credits
BARN3100	BARN3102	7,5 credits
BARN3101	BARN3001	7,5 credits
BARN3200	BARN3201	7,5 credits
BARN3200	BARN3202	7,5 credits
BARN3201	BARN3002	4 credits
BARN3202	BARN3002	4 credits
GEOG3006	GEOG3002	7,5 credits
GEOG3006	GEOG3052	7,5 credits
GEOG3006	GEOG3004	7,5 credits
GEOG3006	AFR3002	7,5 credits
GEOG3006	AFR3005	7,5 credits
SANT3508	SANT3507	5 credits

## **MASTER OF PHILOSOPHY IN DEVELOPMENT STUDIES, SPECIALISING IN GEOGRAPHY**

Approved by the Board at NTNU 16.12.2002, with changes made by the Faculty of Social Sciences and Technology Management 09.01.2013.

### **INTRODUCTION**

The Master in Development Studies, specialising in Geography, is a programme designed for students who want to specialise in development studies and social change. The degree is awarded by the Faculty of Social Sciences and Technology Management at NTNU and administered by the Department of Geography. It is an interdisciplinary degree that is relevant for students with backgrounds in different social sciences and development studies. The programme is relevant for a variety of jobs, including research, planning, resource management, and teaching. Through the MPhil programme in Development studies, specialising in geography, students should:

- Gain a thorough understanding of key concepts and theories within the field of development studies and geography
- Acquire robust/suitable methodological and analytical skills
- Be able to identify and formulate relevant and feasible research objectives for a scientific study
- Be able to carry out an independent research project by:
  - Identifying an appropriate research design, collecting and analysing data
  - Applying relevant theories and when analysing empirical data
  - Writing a scientific text and disseminating scientific knowledge
  - Complying with established ethical norms for research and dissemination.
  - Acquire skills relevant for employment in public and private sectors and in academic research.

The programme is open to both international and Norwegian students. The language of instruction is English for this study programme and we expect students to do all their compulsory and examinations in English. No exceptions will be made in this regard.

### **ADMISSION REQUIREMENTS**

Admittance to this programme requires a Bachelor's degree in Social Sciences. The degree must include at least one year of studies within geography, planning or development studies.

The average grade of the degree must be at least C by the Norwegian grading system, or equivalent, as decided by NTNU.

The language of instruction is English. All lectures and seminars will be held in English, all reading material is in English and all term papers, assignments, exam papers and the thesis must be submitted in English.

The applicants must document their English proficiency by achieving one of the following:

A passing grade from a Norwegian upper secondary school (videregående skole), or through a standardized test:

- TOEFL (Test of English as a Foreign Language) with a minimum score of 600/90 paper based /internet based.
- IELTS (International English Language Testing Service) with a minimum score of 6.5 points

Exceptions from this requirement can be given for certain groups of applicants. For more information about the admission requirements, please consult the following webpage: <http://www.ntnu.edu/studies/langcourses/languagerequirements>.

## COURSE OUTLINE

The programme involves 2 years of full-time studies. The programme is structured around core courses (45 credits), electives (30 credits) and a Master's thesis (45 credits).

The core courses are: GEOG3053 Theories of Development and Globalization, Experts in Teamwork (EiT), GEOG3003 Methodology and the Research Process, GEOG3919 Fieldwork and either GEOG3005 Qualitative Methods or GEOG3006 Quantitative Methods.

Students can choose electives worth 30 credits from a number of courses offered by the Department of Geography or other departments. Most of the electives will be offered in the autumn term. Courses other than those listed below can be chosen as electives. Other courses may be chosen if approval is given by the Department of Geography.

## CORE COURSES

Code	Title	Credits	Term	Admission
EiT	Experts in Teamwork	7,5	Spring	Restricted admission
GEOG3003	Methodology and the Research Process	7,5	Autumn	Open
GEOG3005	Qualitative Methods	7,5	Spring/Autumn	Open
GEOG3006	Quantitative Methods	7,5	Spring	Open
GEOG3053	Theories of Development and Globalization	7,5	Autumn	Open
GEOG3919*	Fieldwork	15	Spring/Autumn	Restricted admission
GEOG3920*	Master's Thesis	45	Autumn/Spring	Restricted admission

\* Requires admission to the programme.

## ELECTIVES

Code	Title	Credits	Term	Admission
GEOG3030	Natural Resources Management	7,5	Autumn	Open
GEOG3505	Landscape and Planning	15	Autumn	Open
GEOG3515	Environment, Development and Changing Rural Livelihoods	7,5	Autumn	Open
GEOG3516	Humanitarianism: Theory and Practice	7,5	Autumn	Open
GEOG3518	Knowledge Management in a Global Economy	7,5	Autumn	Open
GEOG3522	Migration and Development	7,5	Spring	Open
GEOG3523	GIS Data Capture and Mapping	7,5	Spring	Open
AAR4234*	Urban Planning for Sustainability and Development	7,5	Spring	Open
BARN3300	Children and Development in the South	7,5	Autumn	Open
POL3517	International Development: The Effects of Politics, Institutions and International Economy	15	Spring	Open

Elective courses may be cancelled due to the teaching capacity at the Department of Geography or if less than 5 students register for the course.

Check [www.ntnu.no/geografi/studentinformasjon](http://www.ntnu.no/geografi/studentinformasjon) for updated information about what courses are available.

Information about cancellations will be given no later than January 10th in spring term and August 10th in autumn term. For courses available outside the department of Geography, please contact the respective department.

\*Please note deadline for registration.

MPhil in Development Studies, specialising in Geography, programme structure:

Term	Course (7,5 cr)	Course (7,5 cr)	Course (7,5 cr)	Course (7,5 cr)
4. sem/Spring	GEOG3920			
3. sem/Autumn	GEOG3920		Electives (7,5 credits)	GEOG3919
2. sem/Spring	GEOG3005 or GEOG3006	Electives (7,5 credits)	EiT	GEOG3919
1.sem/Autumn	GEOG3053	GEOG3003	Electives (15 credits)	

Candidates are expected to collect data and conduct fieldwork for their thesis in the beginning of the third semester (2-3 months).

### Experts in Teamwork (EIT)

The course is normally taught every Wednesday throughout the spring semester (regular village). It is not possible to take the course as an intensive village in this master's programme.

### COURSE DESCRIPTIONS

Note: Information about any reductions in credits between topics must be checked in the table at the end of this chapter or at the NTNU web site: <http://www.ntnu.no/studier/emner>.

#### Core courses

### GEOG3003 Methodology and the Research Process

#### Methodology and the Research Process

**Teaching:** Autumn: 7.5 Cr

**Language of instruction:** English

**Grade:** Pass/Fail

**Compulsory assignments:** Field course preparations, presentation, field course with report

**Required previous knowledge:** Bachelor's degree in Social Sciences, Biology, Chemistry or Resource Geology or the equivalent. Other relevant qualifications can be accepted by the Department of Geography. The course is also open for students admitted to the 5-year teacher training programme in Geography.

**Learning objectives:** The course gives the students a deeper knowledge on stages of the research process and relations to the common methodologies in the subject. The students should develop relevant skills and experience through participation in a limited field work based on relevant methods and disseminate their research results.

**Academic content:** The course focuses on getting started in geographical research at master level. It is comprised of two main parts: (1) a lecture / seminar part, (2) a field course with additional preparations and seminars. Various methodologies are practiced during the field course, in which students work in groups on particular topics and research objectives. The group work will form part of a common field course report.

Emphasis is placed on developing a critical and reflexive attitude to the choice of research objective, research questions and the application of different methodologies. Some lectures will address the process with developing research objectives and choice of methodology for the master thesis. This process will end in a project assignment which delimits the theme, research objectives / questions and an assessment of research design, appropriate methodology and broader methods in the planned master thesis.

**Teaching methods and activities:** Field course, lectures: 10 hours, seminars: 8 hours. It is expected that compulsories and examinations must be completed in English. Exceptions must be clarified with the lecturer responsible for the course.

**Assessment:** Assignment

Forms of assessment	Time	Percentage	Deadline
Assignment			

## **GEOG3005 Qualitative Methods**

### **Qualitative Methods**

**Teaching:** Both autumn and spring: 7.5 Cr

**Language of instruction:** English

**Grade:** Pass/Fail

**Compulsory assignments:** Reflection notes/individual assignment

**Recommended previous knowledge:** See required previous knowledge.

**Required previous knowledge:** GEOG3003. Other relevant qualifications may be accepted by the Department of Geography. It is optional for those attending the 5-year teacher training programme in Geography (master).

**Learning objectives:** This course is aimed at achieving higher proficiency and understanding of qualitative methodology through providing students with a nuanced understanding of the concepts and techniques of qualitative methodologies and help them in preparing for qualitative research in practice.

**Academic content:** The course focuses on qualitative methodology, such as case study, ethnography, multi-sited methodology, feminist methodology, and discourse analysis. Major emphasis will be on positioning, representation, reflexivity, ethics, and interpretations. Through lectures and exercises skills about how to generate data, conduct analysis and write-up the material when adopting methods such as interviews, Focus Groups Discussions, observation, and text and image analyses are taught. The students will be able to try method(s) that they will adopt in their master thesis, and they will have to write an assignment in which they reflect upon their choice of methodology in their own master thesis.

**Teaching methods and activities:** Autumn semester: Reading course only. Spring semester: 14 hours lectures, 10 hours exercises. Students must choose either GEOG3005 or GEOG3006. It is expected that compulsories and examinations must be completed in English. Exceptions must be clarified with the lecturer responsible for the course.

**Assessment:** Oral examination

Forms of assessment	Time	Percentage	Deadline
Oral examination			

## **GEOG3006 Quantitative Methods**

### **Quantitative Methods**

**Teaching:** Spring: 7.5 Cr

**Language of instruction:** English

**Grade:** Pass/Fail

**Compulsory assignments:** Seminar presentation, group assignment and individual assignments.

**Recommended previous knowledge:** See required previous knowledge.

**Required previous knowledge:** GEOG3003. Other relevant qualifications may be accepted by the Department of Geography. The course is optional /elective for those on the 5-year teacher training programme in Geography (master).

**Learning objectives:** The course gives the students deeper insight in the use of questionnaires and application of selected quantitative methods. Students should be able to apply these methods and techniques, overview their possibilities and limitations and give an adequate interpretation of the (analytical) results in their master thesis.

**Academic content:** The course pursues methodologies into a quantitative array of research schemes. It comprises four parts. (1) The course starts with lectures on questionnaire, (2) followed by group work on construction and presentation of a pilot questionnaire. Part 3 comprises lectures and exercises based on the use of a statistical software package (SPSS) for analysis of data. The main focus will be on statistical analyses of available data (database). However, entering questionnaire data with further analyses may be an option. A research design comprising correlation and regression will be presented, as will other analytical techniques based on the students specific needs. In part 4, students will prepare an assignment in which they reflect on their choice of specific and appropriate methods and techniques directly related to their master thesis.

**Teaching methods and activities:** Lectures: 10 hours, seminars: 10 hours, exercises: 8 hours. Students must choose either GEOG3005 or GEOG3006. It is expected that compulsories and examinations must be completed in English. Exceptions must be clarified with the lecturer responsible for the course.

**Assessment:** Oral examination

Forms of assessment	Time	Percentage	Deadline
Oral examination			

## **GEOG3053 Theories of Development and Globalization**

### **Theories of Development and Globalization**

**Teaching:** Autumn: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Assignment

**Required previous knowledge:** Bachelor in social science. Other relevant qualifications can be accepted upon approval by the Department of Geography.

**Learning objectives:** Students shall broaden their knowledge of theories of social change through an introduction to different analytical perspectives in development theory and practice.

**Academic content:** GEOG3053 Theories of Development and Globalization is an introductory theory course, dealing with fundamental issues of development and globalization and how development and globalization are related. Different theories will be introduced and examined with respect to key concepts and development challenges of our times, such as poverty alleviation and growth, mobility, livelihoods, globalization and marginalization, rights, civil society. The course draws on a wide range of practical and empirical knowledge, as the lecturers represent different areas of specialization within the social sciences and many have cross-cultural experience.

**Teaching methods and activities:** Lectures 20 hours and assignment. It is expected that compulsories and examinations must be completed in English. Exceptions must be clarified with the lecturer responsible for the course.

**Assessment:** Written examination

Forms of assessment	Time	Percentage	Deadline
Written examination	4 Hours		

## **GEOG3919 Fieldwork**

### **Fieldwork**

**Teaching:** 1st sem. spring, 2nd sem. autumn: 15.0 Cr

**Language of instruction:** English

**Grade:** Pass/Fail

**Compulsory assignments:** Two seminars, one before fieldwork and one after fieldwork is completed, as well as progress meetings.

**Required previous knowledge:** This course is reserved for students admitted to the MPhil in Development Studies.

**Learning objectives:** To prepare students for thesis data collection.

**Academic content:** Through seminars and fieldwork this course seeks to give students a chance to prepare themselves appropriately for the data collection for their thesis work, conduct fieldwork and report on their methodological and empirical achievements for their thesis work.

**Course materials:** Individual readings.

**Teaching methods and activities:** Seminars (20 hours), fieldwork (10 weeks), monthly progress meetings.

**Assessment:** Lectures

Forms of assessment	Time	Percentage	Deadline
Participated			

## **GEOG3920 Master Thesis in Development Studies, specialising in Geography**

### **Master Thesis in Development Studies, specialising in Geography**

**Teaching:** 1st sem. autumn, 2nd sem. spring: 45.0 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** None

**Learning objectives:** The aim of the course is to give the students training in doing a substantial individual research project, comprising of methodological and analytical training.

**Academic content:** The thesis consists of a scientific presentation of a chosen topic. The thesis should be 90 - 100 pages (Times Roman 12/ spacing 1.5/ approximately 40000 words). Students must prepare a project proposal as a part of the course GEOG3003. Supervisor will be assigned on the basis of this project proposal. The supervisor and MPhil coordinator must be kept informed about the progress of the writing. Candidates are expected to collect data and conduct fieldwork for their thesis in the beginning of the third semester (2-3 months). The thesis is expected to be completed within four terms from admission to the course. Supervision will not be given beyond this. The thesis must be written individually and in English.

**Teaching methods and activities:** It is expected that compulsories and examinations must be completed in English. Exceptions must be clarified with the lecturer responsible for the course Exam: Thesis and oral. The oral exam is used to adjust the grade given for the thesis.

**Assessment:** Master's thesis

Forms of assessment	Time	Percentage	Deadline
Assignment			



## Elective courses

### AAR4234 Urban Planning for Sustainability and Development VK

**Teaching:** Spring: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Group-based case study on a current building project in Trondheim

**Recommended previous knowledge:** None, but the course will subsequently give priority to attend course AAR4525 Urban Ecological Planning in Developing Countries; Project Work, to AAR4820 Urban Ecological Planning. Theory, and to AAR4816 Urban Ecological Planning, Method.

**Required previous knowledge:** Completed three years basic courses in architecture, bachelor in architecture or equivalent. Registration deadline: 1. december..

**Learning objectives:** Knowledge: The course is to give insight into what "sustainability" and "development" entails for (urban) development and (urban) planning - in a national and a global perspective. The course will highlight how planning and implementation of physical interventions interact with its social and material context. Skills: The students will through the practical class project and discussions develop the ability to critically analyse the premises on which urban development takes place, the actors and processes that determine these premises and the consequences this has for both the immediate context of the project and overall urban development.

#### Academic content:

- Modes of Planning conducive of achieving sustainable urban development - in Norway and internationally
- Use and Management of Natural Resources; Water, Energy, Land
- Transport Land use
- Architecture's contribution towards a sustainable future.
- Housing and settlement planning.
- Agents and institutions and their impact on modes of development

**Course materials:** A total of about 350 pages reading material related to the topics of the lectures.

**Teaching methods and activities:** The course is given in cooperation with several departments at the Faculty of Architecture and Fine Art, the Faculty of Engineering Science and Technology, and the Faculty of Social Science and Technology Management. Weight is placed on interdisciplinary seminars with introductory speakers from other faculties and from specialists with experience in development-related issues. A case study on current urban development projects being planned and/or implemented in Trondheim to explore how the concepts of Development and Sustainability is actually practices in the North and how this might relate to, and bear impact on the overarching global development challenges.

**Assessment:** Written examination/Report

Forms of assessment	Time	Percentage	Deadline
Approved report		1/3	
Written examination	5 Hours	2/3	

### BARN3300 Children and Development in the Global South

#### Children and Development in the Global South

**Teaching:** Autumn: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Approved term paper. Attending lectures is compulsory (minimum 80 %).

**Recommended previous knowledge:** See required previous knowledge.

**Required previous knowledge:** Admittance to the course requires a bachelor's degree in a social science or humanities discipline, or equivalent.

**Learning objectives:**

- To familiarize students with how children in diverse social, economic, cultural and political contexts of the global South fare in their lives.
- To provide students with an interdisciplinary understanding of the complex interrelationship between development processes and young people's everyday lives.
- To provide students with skills in critically evaluating current research and scholarship in the field of children and socio-economic and cultural change.

**Academic content:** The course provides opportunities for students to develop systematic knowledge on how young people are impacted by and respond to various development processes (e.g. national and global policies, structural adjustment programs, international trade and treaties). Specific topics covered include an overview of development theories and childhood theories; young people and socio-cultural change; the meanings and values of children; interventions for children in difficult circumstances (e.g. street children, refugee children); child labour/children's work; education for boys and girls; children, migration and social change; childhood poverty; impacts of HIV/AIDS on children; politics of orphanhood; children and armed conflicts; youth, participation and political activism.

**Course materials:** Information will be given at the beginning of the semester.

**Teaching methods and activities:** Total lecture hours: ca. 20 hours. The course begins with a series of lectures that draws on a selected reading list that constitutes a compendium. Students are required to write a term paper on a topic related to the content of the course. The term paper is not graded but it needs to be submitted and approved before students can qualify to sit for the final written examination.

**Assessment:** Written examination

Forms of assessment	Time	Percentage	Deadline
Written examination	4 Hours		

## **GEOG3030 Natural Resources Management**

### **Natural Resources Management**

**Teaching:** Autumn: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Field course- 3 days, approved field course report

**Required previous knowledge:** Bachelor's degree in Social Sciences, Biology, Chemistry or Resource Geology or the equivalent. Other relevant qualifications can be accepted by the Department of Geography

**Learning objectives:** The course aims to give students insight into questions of nature management through relating theory to practical management. Current management questions will be highlighted through lectures and fieldwork.

**Academic content:** The subject focuses on the challenges facing the management of natural resources, including matters such as dealing with different types of conflict, which require a combination of broad professional and practical insight. The course therefore addresses how different practical and professional perspectives can be combined to give increased insight in selected management challenges. The course will take as its starting point a number of management themes which will be illustrated using current theories together with exam-

ples of practical solutions. The course will be based on one contemporary Norwegian nature resource management conflict. The subject is interdisciplinary and the lectures are held by researchers as well as management representatives.

**Teaching methods and activities:** 18 hours lectures and an obligatory 3-day field course. The field course report must be approved before a student can take the exam. It is expected that compulsories and examinations must be completed in English. Exceptions must be clarified with the lecturer responsible for the course. Please note that the course may be cancelled due to the teaching capacity at the Department of Geography if less than 5 students register for the course. Check [www.ntnu.no/geografi/studentinformasjon](http://www.ntnu.no/geografi/studentinformasjon) for updated information.

**Assessment:** Written examination

Forms of assessment	Time	Percentage	Deadline
Written examination	4 Hours		

## **GEOG3505 Landscape and Planning**

### **Landscape and Planning**

**Teaching:** Autumn: 15.0 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** 1 day fieldcourse and approved term paper/project paper.

**Recommended previous knowledge:** See formal requirements.

**Required previous knowledge:** Bachelor in geography. Other relevant qualifications can be accepted upon approval by the Department of Geography

**Learning objectives:** The course gives insight into theoretical and methodological challenges related to landscape in connection with conservation, management and planning.

**Academic content:** The course discusses the concept of landscape, landscape values, and theoretical and methodological problems in landscape conservation, management and planning. It is offered as an elective course to students taking the Department of Geographys MA degree programmes, and is a compulsory course for students taking the Master degree in cultural heritage management. Students taking the course as part of the M.Phil. in Development Studies and other foreign students are required to write an individual term paper based on the course literature with examples from their own country or another country with which they are familiar. The term paper must be approved before the written exam can be taken.

**Teaching methods and activities:** 24 hours lectures, 16 hours seminars, one day field course, writing of term paper. It is expected that compulsories and examinations must be completed in English. Exceptions must be clarified with the lecturer responsible for the course. Please note that the course may be cancelled due to the teaching capacity at the Department of Geography if less than 5 students register for the course. Check [www.ntnu.no/geografi/studentinformasjon](http://www.ntnu.no/geografi/studentinformasjon) for updated information.

**Assessment:** Written examination

Forms of assessment	Time	Percentage	Deadline
Written examination	6 Hours		

## **GEOG3515 Environment, Development and Changing Rural Livelihoods**

### **Environment, Development and Changing Rural Livelihoods**

**Teaching:** Autumn: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Groupwork and presentation

**Required previous knowledge:** Bachelor in social science. Other relevant qualifications can be accepted upon approval by the Department of Geography.

**Learning objectives:** After the course the students should have an in- depth understanding of the links between development, environmental change and (rural) livelihood in African and Asian societies. Through the presentations the students should demonstrate ability to summarize and present findings from advanced research articles.

**Academic content:** Among the topics covered by the course: \*History of geographical thought: From environmental determinism to political ecology. \*Social nature; Social constructivism and environmental narratives. \*Institutions, norms and collective action and the idea of the «community» as basis for natural resource management. \*Hazards and vulnerability. Vulnerability; a useful concept or just another way of labeling?: Vulnerability analysis in practice \*Environmental conservation and development; from "Fortress conservation" to "Conservation and development"? \*Changing rural livelihoods and livelihood analysis; from farm to non-farm and implications for the rural environments. \* Environment and conflicts. The "Environment" as basis for conflicts.

**Teaching methods and activities:** Lectures: 14 hours. Groupwork and presentations (obligatory). It is expected that compulsories and examinations must be completed in English. Exceptions must be clarified with the lecturer responsible for the course. Please note that the course may be cancelled due to the teaching capacity at the Department of Geography if less than 5 students register for the course. Check [www.ntnu.no/geografi/studentinformasjon](http://www.ntnu.no/geografi/studentinformasjon) for updated information.

**Assessment:** Written examination

Forms of assessment	Time	Percentage	Deadline
Written examination	4 Hours		

## **GEOG3516 Humanitarianism: Theory and Practice**

### **Humanitarianism: Theory and Practice**

**Teaching:** Autumn: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** 2 assignments, compulsory attendance on the introduction day

**Recommended previous knowledge:** The course is given at master's level, a background equivalent to Bachelor in social sciences or extensive field experiences is therefore recommended.

**Learning objectives:** On completion students should be able to show a critical understanding of:

- The humanitarian system, its principles, actors, motivations and practices
- The outcomes of humanitarian crises for individuals and different groups of people
- The global governance of assistance in humanitarian emergencies
- How to develop an understanding of local contexts and local capacities in managing a humanitarian crisis
- The processes from relief to recovery during and after a humanitarian crisis
- The dilemmas between theory and practice

**Academic content:** Embedded in humanitarian action are a number of contentious issues regarding the relationships between political aims of donors and host governments and the people concerned. The course will stress the relationship between theory and practice and how to deal with operational dilemmas on the ground. The lectures will introduce principles and theories of humanitarian action; the various actors involved; the relationship between them and their motivations; the emergence of humanitarian regimes; the relationship between political development and humanitarian practice; humanitarianism and forced mi-

gration; gender, ethnicity and humanitarian challenges; ethical dilemmas, aid conditionality and the Do No Harm and Relief to Development concepts. The lectures are internet based with one day compulsory introductory seminar. For the students present at NTNU some seminars relating to the internet based lectures will be held. Assignments are approved/not approved.

**Teaching methods and activities:** Internet based, 1-day compulsory introductory seminar, altogether equivalent to 16 hours lectures. Altogether equivalent to 16 hours lectures. There will be, additional seminars for the students present at NTNU. It is expected that compulsory assignments and examinations must be completed in English. Exceptions must be clarified with the lecturer responsible for the course. Please note that the course may be cancelled due to the teaching capacity at the Department of Geography if less than 5 students register for the course. Check [www.ntnu.no/geografi/studentinformasjon](http://www.ntnu.no/geografi/studentinformasjon) for updated information.

**Assessment:** Home examination

Forms of assessment	Time	Percentage	Deadline
Home examination			

## **GEOG3518 Knowledge Management in a Global Economy**

### **Knowledge Management in a Global Economy**

**Teaching:** Autumn: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Semester assignment.

**Required previous knowledge:** Bachelor in social science. Other relevant qualification can be accepted upon by approval by the Department of Geography. Students with no background in social sciences are recommended to read an introductory book

**Learning objectives:** The students shall gain theoretical knowledge about economic, political and cultural aspects of industrial globalization. The central aim is to provide a comprehensive insight into the relations between processes of globalization and company strategies. The course provides skills in academic writing on these topics.

**Academic content:** The course offers different perspectives on globalization, together with discussions on how this influences actions and strategies of enterprises and national states. Focus is particularly on business practices in a globalized knowledge economy. Case examples illustrate how businesses can draw on their surroundings and networks locally, regionally, nationally and internationally in their endeavours to innovate. The course presents how strategies and actions occur at the interface between economy, politics and culture. Knowledge development across cultural boundaries is thus a central theme. As part of the course the students have to write an individual semester assignment. The semester assignment must be approved before the examination can be taken.

**Teaching methods and activities:** 18 hours lectures and assignment. The compulsory assignment and the exam must be completed in English. Exceptions must be clarified with the lecturer responsible for the course. Please note that the course may be cancelled due to the teaching capacity at the Department of Geography if less than 5 students register for the course. Check [www.ntnu.no/geografi/studentinformasjon](http://www.ntnu.no/geografi/studentinformasjon) for updated information.

**Assessment:** Written examination

Forms of assessment	Time	Percentage	Deadline
Written examination	4 Hours		

## **GEOG3522 Migration and Development**

### **Migration and Development**

**Teaching:** Spring: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Approved group work and seminar presentation

**Learning objectives:** On completion of this course students should be able to show a critical understanding of:

- National, regional and global patterns of migration with special reference to the Global South
- Causes, motivations and strategies for internal and international migration
- Theoretical perspectives on migration
- The relationships between different understandings and perspectives of migration and development
- Forced and voluntary migration and the relationships between them
- Ways and principles for studying migration and development
- Governance of migration
- Migration as a development strategy

**Academic content:** The course discusses internal and international migration processes in a development context. In particular the course concentrates on understanding the relationship between migration and development by offering theoretical insights into how to conceptualise migration and how development theories have understood the role of migration in development. The course aims to provide analytical approaches for understanding the migration process by introducing debates on causes, practices, migration regimes and policies, as well as the development impacts of internal and international migration. Methodological approaches for researching migration and development will be introduced.

**Teaching methods and activities:** 16 hours lectures, 10 hours group work and presentation (depending on the number of students). Teaching methods include films, discussions and presentations. It is expected that compulsories and examinations must be completed in English. Exceptions must be clarified with the lecturer responsible for the course. Please note that the course may be cancelled due to the teaching capacity at the Department of Geography if less than 5 students register for the course. Check [www.ntnu.no/geografi/studentinformasjon](http://www.ntnu.no/geografi/studentinformasjon) for updated information.

**Assessment:** Written examination

Forms of assessment	Time	Percentage	Deadline
Written examination	4 Hours		

## **GEOG3523 GIS Data Capture and Mapping**

### **GIS Data Capture and Mapping**

**Teaching:** Spring: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Term paper

**Recommended previous knowledge:** GEOG1004, GEOG1511 and GEOG2008.

**Required previous knowledge:** GEOG 3519 Geographical Information Systems I or equivalent.

**Learning objectives:** The course will teach students map making in Geographical Information systems (GIS), starting with data digitization through the production of digital and hard copy maps. There will be emphasis on data modeling and GIS database design, data capture in the field and through the use of remote sensing data. Processing of various types of data (digital elevation models, remote sensing data, aerial photographs, and field observations) for alignment in a GIS is an important topic. Basic cartography will also be covered. By

the end of the course the students should independently be able to produce maps containing social- or physical science data.

**Academic content:** Digitization of data from field work and remote sensing. Processing of data (geographic registration, orthorectification, photogrammetry) and database design. Publication of mapping results in digital and hard copy format. The students will finish a mapping project and produce a map as part of a portfolio assignment. Results from this assignment will influence the final grade for this course.

**Teaching methods and activities:** 16 hours lectures, 16 hours practical exercise work. Both the written exam and the portfolio must be handed in and graded to E or better. It is expected that portfolio hand-ins and examinations must be completed in English. Exceptions must be clarified with the lecturer responsible for the course. Please note that the course may be cancelled due to the teaching capacity at the Department of Geography, or if less than 5 students register for the course. Check [www.ntnu.no/geografi/studentinformasjon](http://www.ntnu.no/geografi/studentinformasjon) for updated information.

**Assessment:** Assignment/Written examination

Forms of assessment	Time	Percentage	Deadline
Assignment		2/5	
Written examination	3 Hours	3/5	

## **POL3517 Internasjonal utvikling: Effektene av politikk, institusjoner og internasjonal økonomi**

### **International development: The Effects of Politics, Institutions and International Economy**

**Teaching:** Spring: 15.0 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Approved term paper

**Recommended previous knowledge:** None.

**Required previous knowledge:** None

**Learning objectives:** Knowledge - the student shall:

- know the connections among global development, international economy and political decisions and institutions.
- demonstrate the ability to apply the theories and models which are central to international development.
- demonstrate independence in the preparation of a semester assignment which fulfills the criteria for scientific writing.

**Academic content:** The course focuses on political, institutional and economic causes of global development and underdevelopment. The course examines central theories on development as well as empirical literature in the field and discusses, among other things, the effects of international trade, investment, and development assistance; the development role of international organizations like the World Bank, IMF, UN and WTO, the impact of migration, domestic constraints on development in poor countries, and the extent to which national authorities enjoy freedom of action to pursue their own development models. The course provides both a historical and contemporary perspective.

**Course materials:** To be decided at the start of the course.

**Teaching methods and activities:** Lectures and group discussions amounting to 4 hours a week. Supervising of term paper. Approved term paper with a length of 4000-5000 words. The term paper can also be written in groups (2-3 students), in which case the required length of the paper will be increased correspondingly. The language of instruction is English. Forms of assessment: 5 hour written exam.

**Assessment:** Written examination

Forms of assessment	Time	Percentage	Deadline
Written examination	5 Hours		

### CREDIT REDUCTIONS DUE TO OVERLAP IN CONTENT

Course	Course	Credits
GEOG3053	GEOG3050	7,5 credits
GEOG3054	GEOG3050	7,5 credits
GEOG3050	GEOG3504	7,5 credits
GEOG3053	GEOG3050	7,5 credits
GEOG3053	SVGEO350	7,5 credits
GEOG3053	GEOG3504	7,5 credits
GEOG3003	GEOG3002	7,5 credits
GEOG3005	GEOG3052	7,5 credits
GEOG3005	AFR3005	7,5 credits
GEOG3005	AFR3002	7,5 credits
GEOG3005	GEOG3004	7,5 credits
GEOG3005	GEOG3002	7,5 credits
GEOG3006	GEOG3002	7,5 credits
GEOG3006	GEOG3052	7,5 credits
GEOG3006	GEOG3004	7,5 credits
GEOG3006	AFR3002	7,5 credits
GEOG3006	AFR3005	7,5 credits
GEOG3510	GEOG3519	6 credits
GEOG3510	GEOG3520	3 credits
GEOG3510	SVGEO328	6 credits
POL3503	POL8503	10 credits
GEOG3510	GEOG3521	6 credits
GEOG3519	GEOG2009	7,5 credits
GEOG3520	SVGEO328	3 credits



## MASTER OF SCIENCE IN GLOBALIZATION

Approved by the Board at NTNU 12.10.2006, with changes made by the Faculty of Social Sciences and Technology Management 07.12.2012.

### A description of the Master's programme in Globalization

The Master's programme in Globalization is a unique inter-disciplinary cooperative programme involving the following faculties at NTNU:

- Humanities
- Social Sciences and Technology Management
- Engineering Science and Technology

During this two-year international Master's programme in Globalization, students will explore the interrelations between the economic, technological, cultural, social and political dimensions of Globalization. The aim of the programme is to provide students with a general understanding of the forms and impacts of the processes of Globalization, combined with an in-depth knowledge of one of the two fields of Specializations:

- Global Production Management (abbreviated 'GPM')
- Global Politics and Culture (abbreviated 'GPC')

### Learning objectives for the Master's programme in Globalization

- Through the master's programme the candidate:

#### *Knowledge*

- has advanced knowledge within the field of globalization studies and specialist knowledge within a given area (e.g. development and globalization, production management, knowledge management, economic restructuring).
- has thorough knowledge about the major theories and methods in globalization research, and hence can apply his/her knowledge on new scientific areas/fields as well as in real life situations.
- has obtained knowledge through work in real life situations through the internship and real work project.

#### *Specific skills*

- can work independently with theoretical and practical problem solving.
- can apply relevant and appropriate methods for research and other knowledge production in an independent manner.
- can analyze and critically relate to different sources and types of information and to apply these to structure and formulating academic argument.
- can conduct a limited research project independently, but under supervision and in accordance with existing ethical norms and guidelines.

#### *General competency*

- has command over the particular discourse and analytical concepts of the globalization research field.
- can apply his/her knowledge and skills to new research areas to implement advanced work tasks and projects.
- can disseminate substantial independent work.
- can contribute to creative and innovative thinking.
- has gained work experience, which is relevant for International organizations and companies.

## **Study environment**

Students will enjoy an interdisciplinary environment at NTNU. Students will study together with students from all over the world and have access to excellent facilities such as a modern library, study rooms and computer labs. Courses from a wide range of disciplines are involved and the globalization students will share experiences with students at several departments.

## **SPECIALIZATION IN GLOBAL POLITICS AND CULTURE**

Globalization and the increased interconnectedness created by the rapid flow of capital, people, goods, images and ideologies across national boundaries require a new set of specialized educational tools. The specialization in Global Politics and Culture aims at making students understand the complex interactions between the political, economic, cultural and social trends which profoundly affect our daily lives in the contemporary world. The student will gain:

- an interdisciplinary perspective on the implications of globalization on civil society, state power, changing patterns of national culture and global markets and technologies
- a clear understanding of the effects of globalization on key actors in the global arena, such as NGOs, global corporations, international campaigning groups, states or multilateral institutions
- the ability to employ interdisciplinary approaches to the practical challenges posed by globalization through an internship undertaken in a global company or organization

## **Career opportunities**

The Master's programme's specialization in Global Politics and Culture is designed to provide its students with the specialist knowledge and transferable skills to pursue careers in global corporations, non-governmental organizations (NGOs), and international campaigning groups, the civil and diplomatic services or in the media, research and information sectors. By the end of their degree, students will have proved their capacity to engage in team work, gained relevant work experience in a global corporation or organization and demonstrated their ability to employ interdisciplinary approaches at both theoretical and practical levels.

## **Admission requirements**

- Successful applicants must have achieved a minimum of the equivalent of a C grade (Norwegian grading system) in their undergraduate degree to be accepted onto this Master's programme, in accordance with NTNU regulations.
- Students with a BA in the Humanities or Social Sciences with a specialization of minimum 80 ECTS credits in a discipline with relevance to the MSc in Globalization's academic components or equivalent from a university or college defined as:
  - Political Science
  - Sociology
  - Social Anthropology
  - History
  - Geography
  - European Studies
  - Economics
  - Development Studies
  - Cultural Studies
  - Cultural Heritage Studies
  - Religious Studies
  - International Relations

For the Global Politics and Culture Specialization, English language requirements for international students are TOEFL 600/90 paper based /internet based or IELTS with 6.5 or better.

## STRUCTURE

The Master's programme in Globalization is a two year programme, which awards a total of 120 ECTS credits, 30 credits per semester over four semesters.

### Core courses

Code	Title	Credits	Term	Admission
GEOG3518	Knowledge Management in a Global Economy	7.5	Autumn	Open
HIST3295	Contemporary International Economic History	7.5	Autumn	Open
SANT3508	Globalization, Theory and Culture	7.5	Spring	Open
GEOG3053	Theories of Development and Globalization	7.5	Autumn	Open
SOS3050*	Empirical Research Methods	7.5	Spring	Open
POL3005	Research Design and Methods for Interdisciplinary Studies	7.5	Autumn/ Spring	Open
**	Internship/Work Project	30	Autumn	***
**	Master's Thesis in Globalization	30	Spring	***

\* Students who already have passed SOS1002 Research Methods in the Social Sciences (15 cr.) must replace SOS3050 with SOS3004 Qualitative Research Methods (7.5 cr.).

\*\* The course code depends on the student's departmental belonging.

\*\*\* Requires admission to the program of study (MSc in Globalization).

### Electives

Code	Title	Credits	Term	Admission
POL3519	State Building, Civil Conflict, Civil War	15	Spring	Open
RVI2175	Religion, Science and Technology in a Global Society*	15	Spring	Open
RVI2115	Religion, Politics and Science in Global Society*	15	Spring	Open
POL3517	International Development: The effects of Politics, Institutions and International Economy	15	Spring	Open

\* RVI2115 will alternate every second year with RVI2175. RVI2115 will NOT be lectured spring 2014.

*MSc in Globalization, specializing in Global Politics and Culture, programme structure:*

Term	7.5 credits	7.5 credits	7.5 credits	7.5 credits
4th sem. Spring	Master's Thesis in Globalization***			
3rd sem. Autumn	Internship***			
2nd sem. Spring	SOS3050 Empirical Research Methods**	SANT3508 Globalization, Theory and Culture	RVI2175 Religion, Science and Technology in a Global Society*	
			RVI2115 Religion, Politics and Science in Global Society*	
			POL3517 International Development: The effects of Politics, Institutions and International Economy	
			POL3519 State Building, Civil Conflict, Civil War	
1. sem. Autumn	GEOG3518 Knowledge Management in a Global Economy	HIST3295 Contemporary International Economic History	POL3005 Research Design and Methods for Interdisciplinary Studies	GEOG3053 Theories of Development and Globalization

\* RVI2115 will alternate every second year with RVI2175. RVI2175 will be lectured spring 2014.

\*\* Students who already have already passed SOS1002 Research Methods in the Social Sciences (15 cr.) must replace SOS3050 with SOS3004 Qualitative Research Methods (7.5 cr.).

\*\*\* The course code depends on the student's departmental belonging.

## INTERNSHIP

The internship scheme related to the Global Politics and Culture specialization provides a unique opportunity for students to develop and build their personal, academic and professional capacities by managing an individual project. The internship project should contribute an interdisciplinary perspective and should be relevant to the needs and requirements of the company/organization. It should lead to the production of a written academic assignment, which will be undertaken under the supervision of a supervisor at NTNU, and a corporate or organizational supervisor.

### Internship Courses

Course	Department	Credits	Term	Admission
RVI3012	Department of Archaeology and Religious Studies	30	Autumn	*
HIST3012	Department of History and Classical Studies	30	Autumn	*
GEOG3012	Department of Geography	30	Autumn	*
POL3012	Department of Sociology and Political Science	30	Autumn	*
IØ3012	Department of Industrial Economics and Technology Management	30	Autumn	*
SANT3012	Department of Social Anthropology	30	Autumn	*

\* Requires admission to the programme of study (MSc in Globalization).

Students are supposed to choose a supervisor from one of the six departments at NTNU.

## MASTER'S THESIS

The 30 ECTS credit Master's thesis should be between 50 and 70 pages in length (12 pt, 1.5 spacing). The contents of the thesis should fulfill an academic level appropriate to a Master's level course. Furthermore, it should relate to the interdisciplinary framework of the taught course element of the Master's programme. A project summary of 300 words should be written in the third semester followed by a more detailed proposal in the form of a written outline of the thesis (around 5 pages) at the beginning of the fourth semester. The thesis should be written over a 20-week period in the fourth semester. The deadline for submission of the thesis is normally May 1st. The students may apply for a two week extension. Students must have passed all the courses on the Masters programme before submitting the Master's thesis. Students must have passed their Master's thesis in order to present themselves for the 30-minute oral exam related to the Master's thesis. The grade for the Master's thesis may be adjusted after the oral exam. The Global Politics and Culture students will normally write their thesis at NTNU, and may relate its contents to the internship assignment.

### Codes for the Master`s thesis

Course	Department	Credits	Term	Admission
RVI3910	Department of Archaeology and Religious Studies	30	Spring	*
HIST3910	Department of History and Classical Studies	30	Spring	*
GE-OG3910	Department of Geography	30	Spring	*
POL3910	Department of Sociology and Political Science	30	Spring	*
IØ3910	Department of Industrial Economics and Technology Management	30	Spring	*
SANT3910	Department of Social Anthropology	30	Spring	*

\* Requires admission to the program of study (MSc in Globalization).

Students are supposed to choose a supervisor from one of the six departments at NTNU.

## COURSE DESCRIPTIONS

Note: Information about any reductions in credits between topics must be checked in the table at the end of this chapter or at the NTNU web site: <http://www.ntnu.no/studier/emner>.

### Core courses

#### **GEOG3053 Theories of Development and Globalization**

**Teaching:** Autumn: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Assignment

**Required previous knowledge:** Bachelor in social science. Other relevant qualifications can be accepted upon approval by the Department of Geography.

**Learning objectives:** Students shall broaden their knowledge of theories of social change through an introduction to different analytical perspectives in development theory and practice.

**Academic content:** GEOG3053 Theories of Development and Globalization is an introductory theory course, dealing with fundamental issues of development and globalization and how development and globalization are related. Different theories will be introduced and examined with respect to key concepts and development challenges of our times, such as poverty alleviation and growth, mobility, livelihoods, globalization and marginalization, rights, civil society. The course draws on a wide range of practical and empirical knowledge, as the lecturers represent different areas of specialization within the social sciences and many have cross-cultural experience.

**Teaching methods and activities:** Lectures 20 hours and assignment. It is expected that compulsories and examinations must be completed in English. Exceptions must be clarified with the lecturer responsible for the course.

**Assessment:** Written examination

Forms of assessment	Time	Percentage	Deadline
Written examination	4 Hours		

### **GEOG3518 Knowledge Management in a Global Economy**

**Teaching:** Autumn: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Semester assignment.

**Required previous knowledge:** Bachelor in social science. Other relevant qualification can be accepted upon by approval by the Department of Geography. Students with no background in social sciences are recommended to read an introductory book

**Learning objectives:** The students shall gain theoretical knowledge about economic, political and cultural aspects of industrial globalization. The central aim is to provide a comprehensive insight into the relations between processes of globalization and company strategies. The course provides skills in academic writing on these topics.

**Academic content:** The course offers different perspectives on globalization, together with discussions on how this influences actions and strategies of enterprises and national states. Focus is particularly on business practices in a globalized knowledge economy. Case examples illustrate how businesses can draw on their surroundings and networks locally, regionally, nationally and internationally in their endeavours to innovate. The course presents how strategies and actions occur at the interface between economy, politics and culture. Knowledge development across cultural boundaries is thus a central theme. As part of the course the students have to write an individual semester assignment. The semester assignment must be approved before the examination can be taken.

**Teaching methods and activities:** 18 hours lectures and assignment. The compulsory assignment and the exam must be completed in English. Exceptions must be clarified with the lecturer responsible for the course. Please note that the course may be cancelled due to the teaching capacity at the Department of Geography if less than 5 students register for the course. Check [www.ntnu.no/geografi/studentinformasjon](http://www.ntnu.no/geografi/studentinformasjon) for updated information.

**Assessment:** Written examination

Forms of assessment	Time	Percentage	Deadline
Written examination	4 Hours		

### **HIST3295 International Economic Contemporary History**

**Teaching:** Autumn: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Approved assignment as part of group instruction/term paper

**Recommended previous knowledge:** None

**Required previous knowledge:** BA in History or equivalent

**Learning objectives:** A candidate who passes this course is expected to have the following learning outcome according to the course curriculum, defined as knowledge and skills:

Knowledge:

Candidate

- should especially get an overview about periods of economic globalization and of economic de-globalization during the last 150 years as well as about their characteristics
- should learn to identify the factors causing these developments and to analyze and describe ? from different perspectives and based on different country case studies ? both the direct effects and repercussions of economic globalization and of economic de-globalization
- should learn to interpret and to contextualize historical statistics

Skills:

Candidate

- should learn to write and to structure a short essay in a proper way as well as to find sources and literature.
- should get good knowledge about the history of globalization and about the basics of development theories and trade theory

**Academic content:** Economic globalization processes cannot only be observed for the most recent decades; rather they occurred also in earlier periods. This course will provide an overview about globalization and de-globalization during the last 150 years. It will especially try to answer the following questions: How did economic globalization develop and what different periods can be observed? What are the specific characteristics of these periods? Which factors caused globalization? Which conditions favored or hampered its development? What effects did globalization have in different respects? And what repercussions, in turn, did these effects have on the further development of globalization? We will further discuss, based on country case studies, why the economic effects of globalization and the reactions to globalization differed among different countries.

**Teaching methods and activities:** Lectures and seminars.

**Assessment:** Home examination

Forms of assessment	Time	Percentage	Deadline
Home examination	4 Days		

## **POL3005 Research Design and Methods for interdisciplinary studies**

**Teaching:** Autumn/Spring: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** None

**Recommended previous knowledge:** Admission to the MSc in Globalization and other masters students with similar background.

**Required previous knowledge:**

**Learning objectives:** The course will introduce students with little or no experience in the social sciences to systematic social-science thinking. It will include an introduction to the philosophy of sciences as well as methodologies, methods and techniques commonly used in contemporary social sciences.

**Academic content:** The course will reflect the wide variety of methods and techniques in the contemporary social sciences. The aim of the course is to give students with backgrounds from different academic disciplines an introduction to systematic social science thinking

which includes an introduction to the philosophy of sciences as well as methodologies, methods and techniques commonly used in contemporary social sciences. In addition, the aim is to give practical guidelines for students on the way to their master thesis. The course will encourage students to reflect on topics for their master thesis. Furthermore, students will gain first experience in formulating a research problem and different exercises will be undertaken which will help the students to write a first research proposal for their later master thesis.

**Course materials:** To be determined in the beginning of the semester.

**Teaching methods and activities:** 2 hours lectures/seminars per week.

**Assessment:** Assignment

Forms of assessment	Time	Percentage	Deadline
Assignment			

### **SANT3508 Globalization Theory and Culture**

**Teaching:** Spring: 7.5 Cr

**Language of instruction:** English

**Credit reduction:** SANT3507: 5sp

**Grade:** Letter grade

**Compulsory assignments:** Written assignment

**Required previous knowledge:** 60 ECTS in Social Anthropology or a bachelor's degree or equivalent.

**Learning objectives:** The candidate has attained

- a broad understanding of the key concepts of globalization theory
- knowledge of various theories of globalization processes
- insight into recent research pertaining to globalization processes

**Skills:**

The candidate has acquired skills to

- assess the implications of globalization for people's everyday life
- analyze the construction of meaning, identity and subjectivity in a globalized world
- analyze the construction of new social imaginaries and cultural repertoires in a globalized world

**Academic content:** Globalization is the buzzword of the 21st century. If we live in a globalized world, what does this mean for our economics, our culture, our work and leisure, even our sense of ourselves? The course offers a survey of the major theories and debates of globalization. The course examines in addition the social and cultural aspects of globalization processes. Globalization processes refers to the intensification of global interconnectedness which entails increased standardization, homogenization and universalization as Western ideologies circulate more widely. Accommodating unifying and standardizing and universalizing impulses, however, we also find more heterogeneous, particular and local expressions, hybridization, creolization and forms of resistance. The deterritorialization of culture and the global flow of commodities, advertising and media give rise to new premises for the construction of meaning, identity and subjectivity, along with new social imaginaries and cultural repertoires.

**Course materials:** See reading list available at the beginning of the semester.

**Assessment:** Written examination

Forms of assessment	Time	Percentage	Deadline
Written examination	4 Hours		



## **SOS3050 Empirical Research Methods**

**Teaching:** Spring: 7.5 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Approved term paper

**Recommended previous knowledge:** None.

**Required previous knowledge:** None.

**Academic content:** The course provides an introduction to the most important empirical in human relations and social sciences. Techniques for the gathering of data include interviewing, observation and the use of written sources and public documents. A basic introduction to the analysis of data, emphasising charts, correlation and multivariate analysis will also be offered.

**Course materials:** To be announced at the beginning of the semester.

**Teaching methods and activities:** Teaching method and activities: Lectures 2 hours per week throughout the semester, group teaching 2 hours per week, lab work and supervision when writing term paper. Compulsory activity: Approved term paper. Form of assessment: 4 hours written exam. Students who already has an exam in SOS1002 Research Methods in the Social Sciences must replace SOS3050 with SOS3004 Qualitative Research Methods.

**Assessment:** Written examination

Forms of assessment	Time	Percentage	Deadline
Written examination	4 Hours		

## **Elective courses**

### **POL3517 International development: The Effects of Politics, Institutions and International Economy**

**Teaching:** Spring: 15.0 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Approved term paper

**Recommended previous knowledge:** None.

**Required previous knowledge:** None

**Learning objectives:** Knowledge - the student shall:

- know the connections among global development, international economy and political decisions and institutions.
- demonstrate the ability to apply the theories and models which are central to international development.
- demonstrate independence in the preparation of a semester assignment which fulfills the criteria for scientific writing.

**Academic content:** The course focuses on political, institutional and economic causes of global development and underdevelopment. The course examines central theories on development as well as empirical literature in the field and discusses, among other things, the effects of international trade, investment, and development assistance; the development role of international organizations like the World Bank, IMF, UN and WTO, the impact of migration, domestic constraints on development in poor countries, and the extent to which national authorities enjoy freedom of action to pursue their own development models. The course provides both a historical and contemporary perspective.

**Course materials:** To be decided at the start of the course.

**Teaching methods and activities:** Lectures and group discussions amounting to 4 hours a week. Supervising of term paper. Approved term paper with a length of 4000-5000 words. The term paper can also be written in groups (2-3 students), in which case the required length of the paper will be increased correspondingly. The language of instruction is English. Forms of assessment: 5 hour written exam.

**Assessment:** Written examination

Forms of assessment	Time	Percentage	Deadline
Written examination	5 Hours		

### **POL3519 State Building, Civil Conflict, Civil War**

**Teaching:** Spring: 15.0 Cr

**Language of instruction:** English

**Credit reduction:** POL2004: 7,5 sp POL3502: 7,5 sp POL8502: 7,5 sp

**Grade:** Letter grade

**Compulsory assignments:** Approved paper proposal

**Recommended previous knowledge:** None

**Required previous knowledge:** None

**Learning objectives:** Knowledge: The students shall:

- have a good overview of theoretical perspectives within the field of state-building and civil war
- have a good overview of the empirical research within the field of state-building and civil war
- have a good overview of current conflict-patterns and trends

**Skills:**

- The students shall demonstrate the ability to write an analytical paper related to the topic and readings

**Academic content:** This course features two fundamental aspects of politics, state-building and civil war. The two concepts are inherently linked. The aim of the course is to understand why civil wars break out, how they are sustained, what it takes to end them, and how to sustain a stable lasting civil peace. Key research questions, relating to the fundamental concerns of onset, continuation, and termination of civil war include: What distinguishes civil war from other forms of civil violence such as genocide, terrorism, organized crime, and in particular from interstate war? Can the same theoretical frameworks be applied to international and internal war? Why do civil wars tend to become more fierce and filled with hatred than other forms of war? Why do intrastate wars routinely display acts of atrocities against civilians and committed by civilians? How do peace settlements after civil wars become sustainable?

**Course materials:** To be decided at the start of the course.

**Teaching methods and activities:** Lectures. Supervision of term paper. Lectures will be given intensively over a couple of weeks throughout the semester. More information on specific dates at the start of the semester. Assessment: Term paper and oral examination. Length of term-paper 6000-8000 words. The oral exam covers the term paper as well as readings. The oral exam will be used to adjust the term paper's grade by a maximum of one grade. If less than 6 students attend the course the first two weeks of teaching, the course will be given as an individual study course with supervision. Please contact the department for further information. The language of instruction is English.

**Assessment:** Assignment

Forms of assessment	Time	Percentage	Deadline
Assignment			

## **RVI2115 Religion, Politics and Science in Global Society**

**Teaching:** Spring: 15.0 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Presentation, 80 % attendance

**Recommended previous knowledge:** Skills equivalent to one year of university studies, including basic courses in religious studies.

**Required previous knowledge:** None.

**Learning objectives:** According to the course curriculum, a candidate who passes this course is expected to have the following learning outcome (defined as knowledge and skills)

Knowledge:

- The candidate has attained
- insight into recent research pertaining to the course`s research questions
- the ability to update his/her own knowledge of the disciplines research questions
- knowledge of what constitutes good scientific practice regarding sources and references

Skills:

The candidate has acquired skills to

- analyse the roles which religion plays both for trans-national actors and international organisations, and their conceptions of nation, ethnicity and science
- analyse how religion is expressed by these actors and organisations in current global debates about democracy, human rights, and science, and their reception in national debates about multiculturalism and integration
- analyse the relationship between research problems and policy problems

**Academic content:** The course focuses on the activities of trans-national actors and international organisations, and the conceptions of religion, nation, ethnicity and science which guide them. Regional focus is mainly (but not exclusively) the Middle East. Examples of relevant problem-areas are debates about multiculturalism and integration on national levels, and the corresponding debates about democracy, human rights, science, natural resources, and security on the level of the global society. The course will also provide further study of the methodological and theoretical issues related to the study of religion, as well as deeper study of selected topics in the history of the discipline. The course will thereby provide a further understanding of various approaches, how theories are formed, and related issues.

**Course materials:** The required reading list will be available at the beginning of the semester.

**Teaching methods and activities:** The teaching consists of lectures and seminars. The lectures and seminars aim at outlining broad frameworks for thinking about the issues which are treated in the course readings, and raising the policy issues touched upon. In order to take the exam the students have to attend at least 80 % of the teaching, and pass three assessment thresholds, subject to the lecturer`s evaluation. The exam consists of a written assignment (8000 words).

**Assessment:** Assignment

Forms of assessment	Time	Percentage	Deadline
Assignment			

## **RVI2175 Religion, Science and Technology in a Global Society**

**Teaching:** Spring: 15.0 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Presentation, 80 % participation

**Recommended previous knowledge:** Skills equivalent to one year of university studies, including basic courses in religious studies.

**Required previous knowledge:** None.

**Learning objectives:** According to the course curriculum, a candidate who passes this course is expected to have the following learning outcome (defined as knowledge and skills):

Knowledge:

The candidate has attained

- a broad understanding of the "deep" history of science and religion
- knowledge of the use of science from within different global religions
- insight into recent research pertaining to the questions above
- the ability to update his/her own knowledge of the disciplines research questions

Skills:

The candidate has acquired skills to ;

- analyse the relationship between technology and value systems such as religion in different parts of the world
- analyse the construction of the following categories in specific global contexts: religion, nature, technology and science
- analyse the relationships between such categories (technology and nature, etc.) in various media, such as film and Internet
- apply tools from the mind sciences to cultural and religious studies

**Academic content:** Technologies both free and enslave us. They seem magical in the sense that we often have very little idea how they work. They also have deep implications about what we value and even what we value ultimately. Although the use of technology can be said to define what it means to be human (for example, in our use of tools), the present-day global focus on the consumption of technology has become so important and valued that it may even constitute a religion. Some of us hold onto the myth that we can be saved by technology, while some hold onto the myth that technology will ultimately destroy us. As such, the course will delve into methodological and theoretical questions from the study of religion, in particular, to pose the argument that religion is primarily about how we as humans relate to and value these «transcendent» technologies.

This course thus looks into the implications that the adoption of universal scientific and technological models has for us as global subjects. It will examine the historical interaction between science and world religions. Students will also be pushed to think about the transnational consumption and circulation of religious, scientific, and technological goods. We will explore both the historical and modern use of religion, science, and technology to ?modulate? human cognition (technologies of the self).

The course will also turn these questions around in an attempt to integrate empirically grounded scientific research of the human condition with humanistic approaches. We will examine how models from biology (such as evolution, ethology, and the endocrinology of emotions) and the mind sciences (neuroscience, philosophy, cybernetics, evolutionary psychology, among others) are applied broadly to explaining and understanding culture, and specifically to explaining and understanding science and religion. With regard to culture, we will examine the consumption of sex, food, and information and the ways in which they are technologically mediated around the world (through Internet, film and other media, fast food, marketing, universities, etc?). With regard to science and religion, we will explore arguments about their biological and cognitive foundations.

Among the pertinent questions we will ask are: What does it mean to be human? Is modern consumer culture a religion? What is its history? How have different global religions understood and employed science? How have technologies changed the human relationship with

our environment and our relations with other animals? What are the possible consequences of such technology for life on our planet? Do theories from cognitive science and biology assist us in making sense of human practices such as religion? What are those theories? Are there ritual origins for the use of technology among humans?

**Course materials:** The required reading list will be available at the beginning of the semester.

**Teaching methods and activities:** The teaching consists of lectures and seminars. The lectures and seminars aim at outlining broad frameworks for thinking about the issues that are treated in the course readings. In order to take the exam the students have to attend at least 80 % of the teaching, and pass three assessment thresholds, subject to the lecturer's evaluation. The exam consists of a written assignment (8000 words).

**Assessment:** Assignment

Forms of assessment	Time	Percentage	Deadline
Assignment			

## Internship courses

### GEOG3012 Internship/Work Project

**Teaching:** Autumn: 30.0 Cr

**Grade:** Pass/Fail

**Compulsory assignments:** Internship

**Required previous knowledge:** Requires admission to the Master's programme in Globalization.

**Learning objectives:** The learning objectives are to develop and build the personal, academic and professional capacities of the students by allowing them to research and manage an individual work project within a global company/organization or a work project at NTNU in cooperation with an international company/organization, using interdisciplinary approaches.

**Academic content:** The students in the Global Politics and Culture specialization will undertake an internship project and must complete an assignment. The assignment has to fulfill the academic requirements of a master's level programme. The assignment has to be an academic piece of work which has to refer to, or include parts of, the internship project. The following are examples of the areas of research covered by the course, and which the internship project could relate to: International Political Economy, International Relations, Social Change, Marginalization and Mobility, Conflict and Peace, Cultural Knowledge, Cross-cultural Management, Knowledge and Technology Transfer and Translation.

**Teaching methods and activities:** The students will have individual supervision from both NTNU and the internship/work place. A compulsory written assignment relating to the internship/work project (between 50 and 55 pages; 12 pt, 1.5 spacing) should be submitted to the NTNU supervisor by 15 December. The assignment will be given a pass/fail grade by the NTNU supervisor.

**Assessment:** Assignment

Forms of assessment	Time	Percentage	Deadline
Assignment			

### HIST3012 Internship/Work Project

**Teaching:** Autumn: 30.0 Cr

**Grade:** Pass/Fail

**Compulsory assignments:** None

**Required previous knowledge:** Bachelor's degree in humanities, social sciences or technology. Requires admission to the Master's programme in Globalization.

**Learning objectives:** A candidate who passes this course is expected to have the following learning outcome according to the course curriculum, defined as knowledge and skills: Objectives

The Candidate should develop and build their personal, academic and professional capacities by researching and managing an individual work project within a global company/organization, or a work project at NTNU in cooperation with a global company/organization

Skills

The Candidate:

- should learn to use interdisciplinary approaches
- should learn to apply the theoretical knowledge acquired at university in a professional environment

**Academic content:** The students in the Global Politics and Culture specialization will undertake an internship project and must complete an assignment. The assignment has to fulfil the academic requirements of a master's level programme. The assignment has to be an academic piece of work which has to refer to, or include parts of, the internship project. The following are examples of the areas of research covered by the course, and which the internship project could relate to: International Political Economy, International Relations, Social Change, Marginalization and Mobility, Conflict and Peace, Cultural Knowledge, Cross-cultural Management, Knowledge and Technology Transfer and Translation.

The students in the Global Technology Management specialization will undertake a work project at NTNU, linked to the university's cooperation projects with industry, on a topic relevant for globalization. The following are examples of the areas of research covered by the course, and which the internship project could relate to: Production Strategy, Technology and ICT Management, Supply Chain Management, Operations Management or Project Management. The Global Technology Management students must write an assignment which fulfills the academic requirements of a master's level programme. The assignment has to be an academic piece of work which has to refer to, or include parts of, the work project.

**Teaching methods and activities:** The students from both specializations will have individual supervision from both NTNU and the internship/work place. The assignment is to be submitted to the student's NTNU supervisor.

A compulsory written assignment relating to the internship/work project (between 50 and 55 pages; 12 pt, 1.5 spacing) should be submitted to the NTNU supervisor by 15 December. The assignment will be given a pass/fail grade by the NTNU supervisor.

**Assessment:** Report

Forms of assessment	Time	Percentage	Deadline
Approved report			

## **IØ3012 Internship/Work Project**

**Teaching:** Autumn: 30.0 Cr

**Language of instruction:** English

**Grade:** Pass/Fail

**Compulsory assignments:** None

**Required previous knowledge:** Requires admission to the Master's programme in Globalization.

**Learning objectives:** The learning objectives are to develop and build the personal, academic and professional capacities of the students by allowing them to research and manage an individual work project within a global company/organization, or a work project at NTNU in cooperation with an international company/organisation, using interdisciplinary approaches.

**Academic content:** The students in the Global Politics and Globalization specialization will undertake an internship project and must complete an assignment. The assignment has to fulfil the academic requirements of a master's level programme. The assignment has to be an academic piece of work which has to refer to, or include parts of, the internship project. The following are examples of the areas of research covered by the course, and which the internship project could relate to: International Political Economy, International Relations, Social Change, Marginalization and Mobility, Conflict and Peace, Cultural Knowledge, Cross-cultural Management, Knowledge and Technology Transfer and Translation.

The students in the Global Technology Management specialization will undertake a work project at NTNU, linked to the university's cooperation projects with industry, on a topic relevant for globalization. The following are examples of the areas of research covered by the course, and which the internship project could relate to: Production Strategy, Technology and ICT Management, Supply Chain Management, Operations Management or Project Management. The Global Technology Management students must write an assignment which fulfills the academic requirements of a master's level programme. The assignment has to be an academic piece of work which has to refer to, or include parts of, the work project.

**Teaching methods and activities:** The students from both specializations will have individual supervision from both NTNU and the internship/work place. The assignment is to be submitted to the student's NTNU supervisor.

A compulsory written assignment relating to the internship/work project (between 50 and 55 pages; 12 pt, 1.5 spacing) should be submitted to the NTNU supervisor by 15 December. The assignment will be given a pass/fail grade by the NTNU supervisor.

**Assessment:** Report

Forms of assessment	Time	Percentage	Deadline
Approved report			

## **POL3012 Internship/Work Project**

**Teaching:** Autumn: 30.0 Cr

**Grade:** Pass/Fail

**Compulsory assignments:** Assignment

**Required previous knowledge:** Admission to the MSc Globalization

**Learning objectives:** The learning objectives are to develop and build the personal, academic and professional capacities of the students by allowing them to research and manage an individual work project within a global company/organization, or a work project at NTNU in cooperation with an international company/organization, using interdisciplinary approaches.

**Academic content:** The students in the Global Politics and Culture specialization will undertake an internship project and must complete an assignment. The assignment has to fulfill the academic requirements of a master's level programme. The assignment has to be an academic piece of work which has to refer to, or include parts of, the internship project. The following are examples of the areas of research covered by the course, and which the internship project could relate to: International Political Economy, International Relations, Social Change, Marginalization and Mobility, Conflict and Peace, Cultural Knowledge, Cross-cultural Management, Knowledge and Technology Transfer and Translation.

**Teaching methods and activities:** The students will have individual supervision from both NTNU and the internship/work place. A compulsory written assignment relating to the internship/work project (between 50 and 55 pages; 12 pt, 1.5 spacing) should be submitted to the NTNU supervisor by 15 December. The assignment will be given a pass/fail grade by the NTNU supervisor.

**Assessment:** Report

Forms of assessment	Time	Percentage	Deadline
Approved report			

## RVI3012 Internship/Work Project

**Teaching:** Autumn: 30.0 Cr

**Credit reduction:** RVI3011: 22,5 sp

**Grade:** Pass/Fail

**Compulsory assignments:** Internship

**Required previous knowledge:** Requires admission to the Master's programme in Globalization.

**Learning objectives:** The learning objectives are to develop and build the personal, academic and professional capacities of the students by allowing them to research and manage an individual work project within a global company/organization or a work project at NTNU in cooperation with an international company/organization, using interdisciplinary approaches.

**Academic content:** The students in the Global Politics and Culture specialization will undertake an internship project and must complete an assignment. The assignment has to fulfill the academic requirements of a master's level programme. The assignment has to be an academic piece of work which has to refer to, or include parts of, the internship project. The following are examples of the areas of research covered by the course, and which the internship project could relate to: International Political Economy, International Relations, Social Change, Marginalization and Mobility, Conflict and Peace, Cultural Knowledge, Cross-cultural Management, Knowledge and Technology Transfer and Translation.

**Teaching methods and activities:** The students will have individual supervision from both NTNU and the internship/work place. A compulsory written assignment relating to the internship/work project (between 50 and 55 pages; 12 pt, 1.5 spacing) should be submitted to the NTNU supervisor by 15 December. The assignment will be given a pass/fail grade by the NTNU supervisor.

**Assessment:** Assignment

Forms of assessment	Time	Percentage	Deadline
Assignment			

## SANT3012 Internship/ Work Project

**Teaching:** Autumn: 30.0 Cr

**Language of instruction:** English

**Grade:** Pass/Fail

**Compulsory assignments:** None

**Required previous knowledge:** Requires admission to the Master's programme in Globalization.

**Learning objectives:** The learning objectives are to develop and build the personal, academic and professional capacities of the students by allowing them to research and manage an individual work project within a global company/organization, or a work project at NTNU in cooperation with an international company/organization, using interdisciplinary approaches.

**Academic content:** The students in the Global Politics and Culture specialization will undertake an internship project and must complete an assignment. The assignment has to fulfill the academic requirements of a master's level programme. The assignment has to be an academic piece of work which has to refer to, or include parts of, the internship project. The following are examples of the areas of research covered by the course, and which the internship project could relate to: International Political Economy, International Relations, Social Change, Marginalization and Mobility, Conflict and Peace, Cultural Knowledge, Cross-cultural Management, Knowledge and Technology Transfer and Translation.

**Teaching methods and activities:** The students have individual supervision from both NTNU and the internship/work place. A compulsory written assignment relating to the internship/work project (between 50 and 55 pages; 12 pt, 1.5 spacing) should be submitted to the



NTNU supervisor by 15 December. The assignment will be given a pass/fail grade by the NTNU supervisor.

**Assessment:** Report

Forms of assessment	Time	Percentage	Deadline
Approved report			

## Master's Thesis Codes

### GEOG3910 Master's Thesis in Globalization

**Teaching:** Spring: 30.0 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Project proposal

**Required previous knowledge:** Requires admission to the Master's programme in Globalization. The student must have completed 90 ECTS/credits within the programme.

**Learning objectives:** The students should be able to work with a specialized topic in an academic manner. The students will be trained in the formulation of research questions and in gathering and analyzing data. The students will achieve competency in analyzing processes of change related to globalization.

**Academic content:** The academic content of the Master's thesis must include a scientific investigation of a theme related to globalization. The thesis must be written in English. It should be between 50 and 70 pages (12 pt, 1.5 spacing), and should demonstrate the student's ability to carry out an independent scientific research task. The content of the thesis should fulfill an academic level appropriate to a Master's level course, and relate to some of the aspects of the interdisciplinary framework of the courses taught in the Master's programme. The topic for the Master's thesis is selected in consultation with a supervisor. The students in the Global Technology Management specialization will write their thesis in an international company or organization. The students in the Global Politics and Culture specialization will normally write their thesis at NTNU.

**Teaching methods and activities:** Individual supervision. Compulsory assignments: A project summary of 300 words should be written in the third semester followed by a more detailed proposal in the form of a written outline of the thesis (around 5 pages) at the beginning of the fourth semester. Both project summary and project proposal should be submitted to the supervisor. Assessment: Thesis and oral examination.

The deadline for submission of the Master's thesis is normally 1 May. The student must have passed all courses in the Master's programme before the Master's thesis can be submitted. The Master's thesis must be approved before the student can present herself/himself for the 30 minute oral examination related to the Master's thesis. The oral examination is held in English. The grade for the Master's thesis may be adjusted after the oral examination.

**Assessment:** Thesis

Forms of assessment	Time	Percentage	Deadline
Thesis		1/1	
Oral examination	30 Minutes		

### HIST3910 Master's Thesis in Globalization

**Teaching:** Spring: 30.0 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Project proposal

**Required previous knowledge:** Bachelor's degree in humanities, social sciences or technology. Requires admission to the Master's Programme in Globalization. The student must have completed 90 ECTS/credits within the programme.

**Learning objectives:** A candidate who passes this course is expected to have the following learning outcome according to the course curriculum, defined as knowledge and skills:  
Knowledge

The Candidate:

- should achieve an extended competence in analysing processes related to globalization by focussing on a well-defined topic

Skills

The Candidate:

- should learn to treat a specialized topic in an academic manner
- should learn to formulate research questions
- should learn to find and analyse qualitative and quantitative sources
- should learn to write in English

**Academic content:** The academic content of the Master's thesis must include a scientific investigation of a theme related to globalization. The thesis must be written in English. It should be between 50 and 70 pages (12 pt, 1.5 spacing), and should demonstrate the student's ability to carry out an independent scientific research task. The contents of the thesis should fulfil an academic level appropriate to a Master's level course, and relate to aspects of the interdisciplinary framework of the taught course element of the Master's programme. The topic for the Master's thesis is selected in consultation with a supervisor. The students in the Global Technology Management specialization will write their thesis in an international company or organization. The students in the Global Politics and Culture specialization will normally write their thesis at NTNU.

**Teaching methods and activities:** Individual supervision. Compulsory assignments: A project summary of 300 words should be written in the third semester followed by a more detailed proposal in the form of a written outline of the thesis (around 5 pages) at the beginning of the fourth semester. Both project summary and project proposal should be submitted to the supervisor. Assessment: Thesis and oral examination.

The deadline for submission of the Master's thesis is normally 1 May. The student must have passed all courses in the Master's programme before the Master's thesis can be submitted. The Master's thesis must be approved before the student can present herself/himself for the 30 minute oral examination related to the Master's thesis. The oral examination is held in English. The grade for the Master's thesis may be adjusted after the oral examination.

**Assessment:** Master's thesis

Forms of assessment	Time	Percentage	Deadline
Assignment		1/1	
Oral examination	30 Minutes		

## **IØ3910 Master's Thesis in Globalization**

**Teaching:** Spring: 30.0 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Project proposal

**Required previous knowledge:** Bachelor's degree in humanities, social sciences or technology. Requires admission to the Master's programme in Globalization. The student must have completed 90 ECTS/credits within the programme.

**Learning objectives:** The students should be able to treat a specialized topic in an academic manner. The students will be trained in the formulation of research questions and in gathering and analyzing data. The students will achieve an extended competence in analyzing processes of change related to globalization.

**Academic content:** The academic content of the Master's thesis must include a scientific investigation of a theme related to globalization. The thesis must be written in English. It should be between 50 and 70 pages (12 pt, 1.5 spacing), and should demonstrate the student's ability to carry out an independent scientific research task. The contents of the thesis should fulfil an academic level appropriate to a Master's level course, and relate to aspects of the interdisciplinary framework of the taught course element of the Master's programme. The topic for the Master's thesis is selected in consultation with a supervisor.

The students in the Global Production Management specialization will write their thesis in an international company or organization. The students in the Global Politics and Culture specialization will normally write their thesis at NTNU.

**Course materials:** Will be announced at the beginning of the course.

**Teaching methods and activities:** Individual supervision. Compulsory assignments: A project summary of 300 words should be written in the third semester followed by a more detailed proposal in the form of a written outline of the thesis (around 5 pages) at the beginning of the fourth semester. Both project summary and project proposal should be submitted to the supervisor.

**Assessment:** Thesis and oral examination. The deadline for submission of the Master's thesis is normally 1 May. The student must have passed all courses in the Master's programme before the Master's thesis can be submitted. The Master's thesis must be approved before the student can present herself/himself for the 30 minute oral examination related to the Master's thesis. The oral examination is held in English. The grade for the Master's thesis may be adjusted after the oral examination.

**Assessment:** Thesis

Forms of assessment	Time	Percentage	Deadline
Thesis		1/1	
Oral examination	30 Minutes		

## **POL3910 Master's Thesis in Globalization**

**Teaching:** Both autumn and spring: 30.0 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Project proposal

**Required previous knowledge:** Requires admission to the Master's programme in Globalization. The student must have completed 90 ECTS/credits within the programme.

**Learning objectives:** Knowledge - the student shall:

- have a theoretically comprehensive knowledge of the specific research topic.
- have knowledge of how one carries out independent research work.
- through the use of obligatory supervision receive an insight into the research process and different levels: engage in constructive and critical evaluation of others? research, plan research in combination with others, collect data, analysis and treatment of data.

Skills - the student shall demonstrate the ability to:

- carry out an independent research work.
- through work on a Master's thesis, acquire skills that are useful not only in relation to research but also i.e in relation to teaching, journalism, investigative work.

**Academic content:** The academic content of the Master's thesis must include a scientific investigation of a theme related to globalization. The thesis must be written in English. It should be between 50 and 70 pages (12 pt, 1.5 spacing), and should demonstrate the student's ability to carry out an independent scientific research task. The contents of the thesis should fulfill an academic level appropriate to a Master's level course, and relate to some aspects of the interdisciplinary framework of the taught course element of the Master's programme. The topic for the Master's thesis is selected in consultation with a supervisor.

**Teaching methods and activities:** Individual supervision. Compulsory assignments: A project summary of 300 words should be written in the third semester followed by a more detailed proposal in the form of a written outline of the thesis (around 5 pages) at the beginning of the fourth semester. Both project summary and project proposal should be submitted to the supervisor. Assessment: Thesis and oral examination.

The deadline for submission of the Master's thesis is May 15th. The student must have passed all courses in the Master's programme before the Master's thesis can be submitted. The Master's thesis must be approved before the student can present herself/himself for the 30 minute oral examination related to the Master's thesis. The oral examination is held in English. The grade for the Master's thesis may be adjusted after the oral examination.

**Assessment:** Thesis

Forms of assessment	Time	Percentage	Deadline
Thesis		1/1	
Oral examination	30 Minutes		

### **RVI3910 Master's Thesis in Globalization**

**Teaching:** Spring: 30.0 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** Project proposal

**Required previous knowledge:** Requires admission to the Master's programme in Globalization. The student must have completed 90 ECTS/credits within the programme.

**Learning objectives:** The students should be able to treat a specialized topic in an academic manner. The students will be trained in the formulation of research questions and in gathering and analyzing data. The students will achieve an extended competence in analyzing processes of change related to globalization.

**Academic content:** The academic content of the Master's thesis must include a scientific investigation of a theme related to globalization. The thesis must be written in English. It should be between 50 and 70 pages (12 pt, 1.5 spacing), and should demonstrate the student's ability to carry out an independent scientific research task. The contents of the thesis should fulfill an academic level appropriate to a Master's level course, and relate to some of the aspects of the interdisciplinary framework of the courses taught in the Master's programme. The topic for the Master's thesis is selected in consultation with a supervisor.

**Teaching methods and activities:** Individual supervision. Compulsory assignments: A project summary of 300 words should be written in the third semester followed by a more detailed proposal in the form of a written outline of the thesis (around 5 pages) at the beginning of the fourth semester. Both project summary and project proposal should be submitted to the supervisor. Assessment: Thesis and oral examination.

The deadline for submission of the Master's thesis is normally 1 May. The student must have passed all courses in the Master's programme before the Master's thesis can be submitted. The Master's thesis must be approved before the student can present herself/himself for the 30 minute oral examination related to the Master's thesis. The oral examination is held in English. The grade for the Master's thesis may be adjusted after the oral examination.

**Assessment:** Thesis/Oral examination

Forms of assessment	Time	Percentage	Deadline
Thesis		100/100	
Oral examination	30 Minutes		

### **SANT3910 Master Thesis in Globalization**

**Teaching:** Both autumn and spring: 30.0 Cr

**Language of instruction:** English

**Grade:** Letter grade

**Compulsory assignments:** None

**Required previous knowledge:** Requires admission to the Master's programme in Globalization. The student must have completed 90 ECTS/credits within the programme.

**Learning objectives:** The students should be able to treat a specialized topic in an academic manner. The students will be trained in the formulation of research questions and in gathering and analysing data. The students will achieve an extended competence in analysing processes of change related to globalization.

**Academic content:** The academic content of the Master's thesis must include a scientific investigation of a theme related to globalization. The thesis must be written in English. It should be between 50 and 70 pages (12 pt, 1.5 spacing), and should demonstrate the student's ability to carry out an independent scientific research task. The contents of the thesis should fulfil an academic level appropriate to a Master's level course, and relate to some of the aspects of the interdisciplinary framework of the taught course element of the Master's programme. The topic for the Master's thesis is selected in consultation with a supervisor.

**Teaching methods and activities:** Individual supervision. Compulsory assignments: A project summary of 300 words should be written in the third semester followed by a more detailed proposal in the form of a written outline of the thesis (around 5 pages) at the beginning of the fourth semester. Both project summary and project proposal should be submitted to the supervisor. Assessment: Thesis and oral examination. The deadline for submission of the Master's thesis is normally 1 May. The student must have passed all courses in the Master's programme before the Master's thesis can be submitted. The Master's thesis must be approved before the student can present herself/himself for the 30 minute oral examination related to the Master's thesis. The oral examination is held in English. The grade for the Master's thesis may be adjusted after the oral examination.

**Assessment:** Thesis/Oral examination

Forms of assessment	Time	Percentage	Deadline
Thesis		100/100	
Oral examination	30 Minutes		

### **SPECIALIZATION IN GLOBAL PRODUCTION MANAGEMENT**

Global production and the intensifying competitive challenges in the world market calls for an understanding of how strategic improvements can be made at the supply chain, enterprise and operations level. Global Production Management aims at giving students a holistic theoretical foundation and analytical skills to effectively address these challenges. The students will gain a broad and integrated set of capabilities, combining engineering and management competences with a global perspective.

#### **Learning objectives for the specialization**

The candidate will obtain the following knowledge, skills and general competencies through the specialization:

### *Knowledge*

- Advanced knowledge in global production management, and specialist knowledge in production strategy, production logistics, purchasing management, enterprise resource planning, or supply chain management in global enterprises
- Thorough knowledge about the strategic concepts and major models, technologies, methods and analysis techniques in global production research, and hence can apply his/her knowledge on new scientific areas and engineering challenges
- Knowledge on managing in a global economy

### *Skills*

- Can work independently with theoretical and practical problem solving, and apply his/her knowledge to analyse, improve, and manage global production enterprises in such a way that the overall competitiveness is improved
- Can apply theory to develop practical solutions based on a critical evaluation of relevant alternatives
- Can apply appropriate models, technologies, methods, and analysis techniques in an independent manner
- Can conduct a minor research or development project independently, but under supervision

### *General competency*

- Has a understanding of the strategic, technological, ethical, and environmental challenges facing production enterprises that compete in a global market
- Can communicate production problems and solutions to specialists and the public. Can cooperate and contribute to multidisciplinary interaction.
- Can lead and motivate employees in global production enterprises
- Has obtained knowledge through group work, projects, and contact with industry that can be applied in real life management problems

### **Career opportunities**

The specialization in Global Production Management is designed to give students the skills to establish, develop, and manage global production enterprises in order to improve overall competitiveness. Students will be able to understand and successfully handle processes and technology in production, and can pursue careers in global production enterprises, global logistics enterprises, and business consultancy.

### **Admission requirements**

- Admission to the programme requires a BSc in a Technological or Engineering discipline or equivalent from a university or college. Successful applicants must have achieved a minimum of the equivalent of a C grade (Norwegian grading system) in their undergraduate degree to be accepted onto this Master's programme, in accordance with NTNU regulations. The English language requirements for international students are TOEFL 600/90 paper based /internet based or IELTS with 6.5 or better.
- Students at selected departments at NTNU who have finished the first 3 years of a 5-year Masters of Technology/Engineering programme, may opt into the programme by applying to the relevant Study Board(s) of their current programme.

### **STRUCTURE**

The Specialization in Global Production Management is a two year programme, which awards a total of 120 ECTS credits, 30 credits per semester over four semesters.

Term	7.5 credits	7.5 credits	7.5 credits	7.5 credits
4th sem. Spring	TPK 4900 Master's Thesis (in Production and Quality Engineering) or IØ 3910 Master's Thesis in Globalization			
3rd sem. Autumn	TPK 4510 Production and Quality Engineering, Specialization Project or IØ3092 Strategic Purchasing Management, Specialization Project		TPK 4515 Production and Quality Engineering, Specialization Course or IØ3091 Strategic Purchasing Management, Specialization Project	TIØ4195 Environmental management and Corporate Governance
2nd sem. Spring	TPK4110 Quality and Performance Oriented Management	TPK4180 Manufacturing Strategy	TPK4135 Logistics and Production Management or TIØ4175 Purchasing and Logistics Management	MET3007 Research Design and Methods for Interdisciplinary Studies
1st sem. Autumn	TIØ4146 Finance for Science and Technology Students	TPK4165 ERP and PLM Systems	TPK4160 Value Chain Control and Applied Decision Support or TIØ4265 Strategic Management	GEOG3518 Knowledge Management in a Global Economy

### Core courses

*These courses are compulsory for all students at the specialization.*

Code	Title	Credits	Term	Admission
GEOG3518	Knowledge Management in a Global Economy	7,5	Autumn	Open
TIØ4146	Finance for Science and Technology Students	7,5	Autumn	Open
TPK4165	ERP and PLM Systems	7,5	Autumn	Open
TPK4110	Quality and Performance Oriented Management	7,5	Spring	Open
TPK4180	Manufacturing Strategy	7,5	Spring	Open
MET3007	Research Design and Methods for Interdisciplinary Studies	7,5	Spring/ Autumn	Open
TIØ4195	Environmental management and Corporate Governance	7,5	Autumn	Open

## Elective courses

The students must choose between two “strings” of courses:

### *String 1: Production Management*

Code	Title	Credits	Term	Admission
TPK4160	Value Chain Control and Applied Decision Support	7,5	Autumn	Open
TPK4135	Logistics and Production Management	7,5	Spring	Open
TPK4510	Production and Quality Engineering, Specialization Project	15	Autumn	Open
TPK4515	Production and Quality Engineering, Specialization Course	7,5	Autumn	Open
TPK4590	Master’s Thesis (in Production and Quality Engineering)	30	Spring	Restricted admission

### *String 2: Purchasing Management*

Code	Title	Credits	Term	Admission
TIØ4265	Strategic Management	7,5	Autumn	Open
TIØ4175	Purchasing and Logistics Management	7,5	Spring	Open
IØ3092	Strategic Purchasing Management, Specialization Project	15	Autumn	Open
IØ3091	Strategic Purchasing Management, Specialization Course	7,5	Autumn	Open
IØ 3910	Master’s Thesis in Globalization	30	Spring	Restricted admission

## Work project (TPK4510 and IØ3092)

Students will spend their third semester undertaking a work project at NTNU, linked to the university’s cooperation projects with industry, on a topic relevant for global operations. Education in Global Production Management is based on students experiencing and exploring real-life industrial challenges in global enterprises. Theoretical topics are exemplified and discussed based on cases from Norwegian and international companies and research projects. The work project will be geared at solving industrial challenges within areas such as production strategy, production logistics, purchasing management, enterprise resource planning, or supply chain management. Students will be required to produce a written academic assignment, relating to the internship/work project (between 30 and 40 pages; 12 pt, 1.5 spacing), which should be submitted to NTNU by the end of the second semester. The assignment should relate to the taught element of the programme and fulfill the academic requirements of a Master’s level programme. The course requires admission to the Specialization in Global Production Management. Students are supposed to choose a supervisor from the Department of Production and Quality Engineering or the Department of Industrial Economics and Technology Management.



**Master's thesis (TPK 4900 and IØ3910)**

The 30 ECTS credit Master's thesis should be between 50 and 70 pages in length (12 pt, 1.5 spacing). The contents of the thesis should fulfill an academic level appropriate to a Master's level course. Furthermore, it should relate to the interdisciplinary framework of the taught course element of the Master's programme. A project summary of 300 words should be written in the third semester followed by a more detailed proposal in the form of a written outline of the thesis (around 5 pages) at the beginning of the fourth semester. The thesis should be written over a 20-week period in the fourth semester. The students may apply for a two week extension. Students must have passed all the courses on the Master's programme before submitting the Master's thesis.

The Global Production Management students will write their thesis for an international company. The course requires admission to the Specialization in Global Production Management. Students are supposed to choose a supervisor from the Department of Production and Quality Engineering or the Department of Industrial Economics and Technology Management, in accordance with the string chosen.

**COURSE DESCRIPTIONS**

To be found at NTNUs web pages: [www.ntnu.edu/studies/allstudies](http://www.ntnu.edu/studies/allstudies)

# MASTER OF SCIENCE OF EXERCISE PHYSIOLOGY AND SPORT SCIENCES

## 2-year Master of Science (MSc)

Programme code: MSPORT

Webpage: [www.ntnu.edu/studies/msport/](http://www.ntnu.edu/studies/msport/)

This programme description is valid for students admitted in the academic year 2013/2014.

### Introduction

The Master of Science in Exercise Physiology and Sport Sciences is a research and thesis-based integrated programme of study at the Faculty of Medicine. It is exclusively concerned with basic research training and comprises compulsory courses together with specialization courses dependent upon the research interest of students.

The MSc programme is associated with the research group in Exercise Training at the Department of Circulation and Medical Imaging. One of the main research interests of this group is to examine basic mechanisms behind potential limitations to supply and demand of oxygen transport, and to identify training responses. The group is also involved in examining the mechanisms behind muscular and neural limitations to strength and coordination, the prescription of effective endurance and strength training, and the effects on top sports performance.

Another aspect is based upon the fact that the fastest developing diseases within the population, such as obesity, atherosclerosis, diabetes II, osteoporosis and chronic obstructive pulmonary disease (COPD), are related to inactivity. Effective new training interventions based on basic biological adaptations have positive effects and are effective treatments with high socioeconomic as well as quality of life outcomes.

### Learning Outcome

The graduated student should be able to:

- demonstrate in depth insight in Exercise Physiology and Sport Sciences reaching from the molecular to whole body level, and have practical skills relevant for the field;
- describe how physical activity and exercise influence the heart, arteries and skeletal muscles in our bodies, both for health and performance;
- identify and describe the limitations for the energy delivery and utilization, as well as the muscular and neural limitations for strength and coordination;
- understand and describe the beneficial effects of physical activity for successful aging and disease prevention, and prescribe effective training programmes for treatment;
- formulate a research question based on adequate insight into current knowledge within Exercise Physiology and Sport Sciences;
- apply and adopt experimental methods to gain new knowledge within Exercise Physiology and Sport Sciences;
- present, evaluate and discuss scientific results in English (orally and in writing).

### Target Groups and Admission Requirements

Candidates should hold a bachelor's degree (or 3-year equivalent), preferably within biochemistry, biology, exercise physiology/sport sciences, movement science, nursing, occupational therapy, physiotherapy, or similar fields. A firm foundation in human biology is required. The minimum average grade required is the Norwegian "C".

International applicants need to submit proof of English proficiency (TOEFL, IELTS, APIEL or University of Cambridge test). More details about the language requirements are available at [www.ntnu.edu/studies/langcourses/languagerequirements](http://www.ntnu.edu/studies/langcourses/languagerequirements)

Applicants who are not citizens of the European Union (EU) or the European Economic Area (EEA) need to provide a financial guarantee to get a residence permit in Norway.

### Teaching Methods and Learning Activities

In 2010 the new Hearth and Lung Centre opened at Øya campus in Trondheim. In this building students get to work in high-tech laboratory environments side by side with researchers both from NTNU and St. Olav's Hospital.

The teaching includes lectures, colloquiums, problem-based learning (PBL), seminars, demonstrations, practical training, self-tuition, and independent work. During the work with the master's thesis the student will do research in our well-equipped laboratories.

### Programme Structure

The master's degree is a two-year, full-time programme starting in the autumn semester. There are two main components:

- Theoretical and methodological courses (totalling 60 credits)
- Master's thesis (60 credits)

The first semester is primarily based on theory and lectures. From the second semester most attention is directed towards preparing for carrying out an experiment representing work at the forefront of the research in exercise physiology in close co-operation with the professors in the research group. The quality of research is high, and the research project is expected to contain data of a quality that makes international publication possible.

Year 1		Year 2	
1 <sup>st</sup> semester (autumn)	2 <sup>nd</sup> semester (spring)	3 <sup>rd</sup> semester (autumn)	4 <sup>th</sup> semester (spring)
<i>KLH3100</i> Introduction to Medical Statistics (7.5 credits)	<i>EiT</i> Experts in Teamwork (7.5 credits)	<i>SPO3900</i> Thesis in Exercise Physiology (60 credits)	
<i>SPO3020</i> Training Circulation and Oxygen Consumption (7.5 credits)	<i>SPO3040</i> Environmental Adaptations (7.5 credits)		
<i>SPO3030</i> Training Muscle and Force Production (7.5 credits)	<i>SPO3060</i> Specialisation in Exercise Physiology (15 credits)		
<i>SPO3055</i> Research Methods in Exercise Physiology (7.5 credits)			

Experts in Teamwork (EiT) is compulsory for all master's degree students at NTNU, and it is taught intensively in the weeks 2, 3 and 4 in the second semester. Read more about EiT here: [www.ntnu.edu/dmf/studies/eit](http://www.ntnu.edu/dmf/studies/eit)

By the end of the first semester, the student must choose a topic for the thesis. A master's thesis agreement (including a project description) is drawn up by the student and submitted to the programme board within the first academic year. More information is available at [www.ntnu.edu/dmf/studies/master](http://www.ntnu.edu/dmf/studies/master) (in English) / [www.ntnu.no/dmf/studier/master](http://www.ntnu.no/dmf/studier/master) (in Norwegian).

The student must have passed all theoretical and methodological courses before he/she can submit the thesis.

### **Course Descriptions**

See [www.ntnu.edu/dmf/studies/courses](http://www.ntnu.edu/dmf/studies/courses)

# MASTER OF SCIENCE IN MOLECULAR MEDICINE

## 2-year Master of Science (MSc)

Programme Code: MSMOLMED

Webpage: [www.ntnu.edu/studies/msmolmed](http://www.ntnu.edu/studies/msmolmed)

This programme description is valid for students admitted in the academic year 2013/2014.

### Introduction

The field of Molecular Medicine is often referred to as “tomorrow’s medicine”. It aims to provide a molecular understanding of how normal cellular processes change, fail or are destroyed by disease.

The mapping of the human genome in 2003 was a turning point, and our knowledge and understanding of molecules in living organisms are advancing at a fast rate. Modern technologies such as high-throughput analyses (microarray and proteomics) enable us to study thousands of genes and proteins simultaneously. This provides the foundation for a totally new understanding of biological systems and generates fresh hypotheses about the importance of genes and proteins for different diseases.

The MSc in Molecular Medicine is administered by the Department of Laboratory Medicine, Children’s and Women’s Health at the Faculty of Medicine.

### Learning Outcome

The graduated student should be able to:

- demonstrate a strong background in molecular medicine (i.e. molecular/cell biology relevant to medical applications) and have practical skills relevant for the field;
- describe the organization of the human genome and its functional regulation (i.e. replication, gene expression, genome maintenance, and signal transduction principles);
- describe the impact of genes, inheritance and environment on disease, and understand how normal cellular processes change, fail or are destroyed by disease development, in particular for common diseases such as cancer, diabetes, and heart disease;
- explain principles of molecular diagnostics and advantages/limitations of its applications;
- recognize and explain current strategies and state-of-the-art approaches within functional genomics;
- collect relevant background information about topics within molecular medicine;
- present, evaluate and discuss scientific results in English (orally and in writing);
- reflect on the existence of ethical aspects, sound experimental approaches and scientific thinking.

### Target Groups and Admission Requirements

Admission requirements to the MSc in Molecular Medicine is a bachelor’s degree (or an equivalent 3-year education) in biology, biomedical science, biotechnology, chemistry or similar, with an average grade of C or higher. A solid background in cell and molecular biology is highly recommended within the bachelor’s degree.

International applicants need to submit proof of English proficiency (TOEFL, IELTS, APIEL or University of Cambridge test). More details about the language requirements are available at [www.ntnu.edu/studies/langcourses/languagerequirements](http://www.ntnu.edu/studies/langcourses/languagerequirements). Applicants who are not citizens of

the European Union (EU) or the European Economic Area (EEA) need to provide a financial guarantee to get a residence permit in Norway.

### Teaching Methods and Learning Activities

In 2005 the new Laboratory Centre opened at Øya campus in Trondheim. In this building students get to work in high-tech laboratory environments side by side with researchers both from NTNU, Sør-Trøndelag University College and St. Olav's Hospital.

The teaching methods and learning activities include lectures, colloquiums, problem-based learning (PBL), seminars, demonstrations, excursions, practical training, self-tuition, and independent work. During the work with the master's thesis the student will do research in our well-equipped laboratories.

### Programme Structure

The MSc is a two-year, full-time programme of study starting in the autumn semester. There are two main components:

- Master's thesis (60 credits)
- Theoretical and methodological courses (totalling 60 credits). Two courses, making up 22.5 credits, are compulsory. The remaining courses, adding up to 37.5 credits, are selected from lists of electives. Ideally, electives should be linked to the topic of the master's thesis.

There are two lists of elective courses (see below). *Two courses* must be selected from 'Electives 1'. The remaining elective courses can be chosen from both 'Electives 1' and 'Electives 2'. Additional relevant courses may be taken at NTNU or other educational institutions subject to the approval of the Faculty of Medicine.

A master's thesis agreement, including a project description, must be submitted by 15 March in the second semester. Potential projects will be presented in advance.

### Master's Thesis

MOL3901	Thesis in Molecular Medicine	60 credits
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### Compulsory Courses

MOL3100	Introduction to Molecular Medicine with Project	15 credits (autumn)
Various codes <sup>1</sup>	Experts in Teamwork	7.5 credits (spring)

### Electives 1

BI3016	Molecular Cell Biology	7.5 credits (autumn)
MOL3001	Medical Genetics	7.5 credits (spring)
MOL3005	Immunology	7.5 credits (autumn)
MOL3007	Functional Genomics	7.5 credits (spring)
MOL3008 <sup>2</sup>	Analytical Techniques and Instrumentation	7.5 credits

<sup>1</sup> Experts in Teamwork (EiT) is taught intensively in the weeks 2, 3 and 4 in the second semester. Read more about EiT on this webpage: [www.ntnu.edu/dmf/studies/eit](http://www.ntnu.edu/dmf/studies/eit)

		(autumn)
MOL3019	Applied Bioinformatics	7.5 credits (spring)

## Electives 2

BI3013 <sup>3</sup>	Experimental Cell and Molecular Biology	7.5 credits (autumn)
BI3018	Patenting and Commercialization of Biotech and Medtech Inventions	7.5 credits (spring)
BT3103	Molecular Mechanisms of Toxicology	7.5 credits (autumn)
KLH3100	Introduction to Medical Statistics	7.5 credits (autumn)
MOL3003 <sup>4</sup>	Molecular Medical Microbiology	7.5 credits (autumn)
MOL3009	Biobanking	7.5 credits (autumn)
MOL3010	Animal Cell Culture	7.5 credits (autumn)
MOL3014	Nanomedicine I – Bioanalysis	7.5 credits (autumn)
MOL3015	Nanomedicine II – Therapy	7.5 credits (spring)
MOL3018	Medical Toxicology	7.5 credits (spring)
MOL3020	Molecular Virology	7.5 credits (spring)
NEVR8014	Laboratory Animal Science for Researchers	7.5 credits (autumn)

Some of the elective 2 courses may be cancelled if few students register for the examination.

## Model of the MSc Programme (Example)

Year 1		Year 2	
<i>1<sup>st</sup> semester (autumn)</i>	<i>2<sup>nd</sup> semester (spring)</i>	<i>3<sup>rd</sup> semester (autumn)</i>	<i>4<sup>th</sup> semester (spring)</i>
Introduction to Molecular Medicine with Project	Experts in Teamwork	Thesis in Molecular Medicine	
	Elective course		
Elective course	Elective course		

<sup>2</sup> The course will not be taught if less than 12 students register for the examination. If you intend to take the course, we kindly ask you to register early (preferably by 1 September 2013).

<sup>3</sup> The course has restricted admission, and will be open for master's students in Molecular Medicine only if there are any available seats. Please contact the Department of Biology if you are interested.

<sup>4</sup> The course has restricted admission. Two-thirds of the seats are reserved for the first-year master's students in Molecular Medicine. One-third of the seats are reserved for second-year master's students in Molecular Medicine and other master's students at NTNU.

Elective course	Elective course	
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Please note that this is only a suggestion. The student can choose to start with the thesis already in the first year and postpone one or more of the elective courses to the second year.

The student must have passed all examinations in compulsory and elective courses before he/she can submit the thesis.

### **Course Descriptions**

See [www.ntnu.edu/dmf/studies/courses](http://www.ntnu.edu/dmf/studies/courses)



# MASTER OF SCIENCE IN NEUROSCIENCE

## 2-year Master of Science (MSc)

Programme code: MSNEUR

Webpage: [www.ntnu.edu/studies/msneur](http://www.ntnu.edu/studies/msneur)

This programme description is valid for students admitted in the academic year 2013/2014.

### Introduction

The MSc in Neuroscience provides an in-depth study of brain structure and -function, reaching from the molecular to systems level. A central aim for students is to understand how neural systems may contribute to sensory experiences, thoughts, emotions and behaviour, and learn to adopt experimental methods to gain new knowledge in the field.

The MSc in Neuroscience is an interdisciplinary collaboration between the following faculties:

- Humanities
- Information Technology, Mathematics and Electrical Engineering
- Medicine
- Natural Sciences and Technology
- Social Sciences and Technology Management

The MSc is coordinated by the Programme Board of Neuroscience, with representatives from the students and the participating faculties. It is administered by the Department of Neuroscience at the Faculty of Medicine.

The degree awarded to students completing the programme will be *Master of Science in Neuroscience*. Completion of the master's degree is a qualification for studies at the PhD level.

### Learning Outcome

#### General learning outcome

A solid knowledge about neuroscience, good experimental and theoretical skills, and competence to obtain and critically appraise own and already published experimental and theoretical data and to pursue a career in neuroscience.

#### Specific learning outcome

##### *Knowledge*

- The student has advanced knowledge of the research field of neuroscience including its subareas (Molecular and Cellular neuroscience, Systems Neuroscience (including comparative neuroscience), Computational Neuroscience and Cognitive Neuroscience) and disciplines (Anatomy, Physiology, Biochemistry, in vivo and in vitro Imaging techniques at cellular and network level, neurogenetics, neurophysics).
- The student has knowledge of relevant methodologies and techniques in neuroscience including both historical as well as more recent techniques.
- The student has knowledge about:
  - Sensory systems (somatosensory, visual, auditory, olfactory and taste, vestibular, pain, visual streams, barrel cortex, topographic organization, homunculus)

- Motor systems (prim motor system, basal ganglia, cerebellum)
- association cortex (definitions and different levels such as prefrontal, parietal, temporal cortex, etc.)
- monosynaptic and complex reflex networks at spinal cord and brainstem levels.
- The student has specialized knowledge in at least one of the above mentioned disciplines.
- The student has knowledge about the main current theoretical concepts in Neuroscience, and can apply this to his/her own research: Chemical and electrical signaling, cellular integration, regulation of neuronal activity, excitatory and inhibitory transmission and the related cellular mechanisms (transmitter synthesis, packaging, release, receptor binding, location and regulation of receptor expression). Theorems include cortical networks, hierarchical processing, feedforward and feedback connectivity. Primary and higher order (association) cortex, oscillations and their functions, concepts of neuronal networks. Role of thalamocortical and cortico-basal ganglia networks, default networks, (monoaminergic/subcortical )modulation, and computational models including connectionists models (small world networks, spin glass models) and oscillatory models.
- The student has knowledge about mainstream concepts of neurophilosophy and ethics. The student is aware of and has knowledge of the relevant historical perspectives in neuroscience, its traditions and the position in the society. Is aware of debates in the field on neurophilosophy, theory of mind and discussions on consciousness.

### *Skills*

- The student is capable of analyzing main outstanding issues in neurosciences, follow and analyze ongoing debates in the field, with special knowledge in at least one domain.
- The student knows how to find relevant methods and how to apply those to his/her project/question of interest.
- The student has competence to analyze experimental data, put them in a context of relevant available (published) data in neuroscience and directly adjacent fields such as psychology, and the ethical and societal issues related to neuroscience research and is able to communicate experimental results both orally and in a number of specific written formats.
- The student can analyze existing theories, methods and assumptions within the field of neuroscience.
- The student can recognize and validate problems; formulate and test hypotheses.
- The student can evaluate and formulate a theoretical concept. Evaluation includes originality, independence and applicability.
- The student can, with supervision, perform a research project independently, including the formulation of the research question based on good general insight in the field, experimental design and implementation, results analyses and reporting.
- The student is capable of adequate analysis of findings, including appropriate levels of statistics and integration with existing (published) information.
- The student can summarize, document, report, and reflect on own findings.

### *General competence*

- The student knows how to analyse relevant general issues in neuroscience including field specific theorems and ethical issues, including how to decide on animal and human research, general insight in ways to diminish research that causes suffering to humans

and animals and knows how to evaluate and weight the outcome to the inflicted suffering.

- The student is capable to apply his/her knowledge and capabilities to analyse and carry out complex experiments in neuroscience in not-familiar domains.
- The student has proven capability to apply his/her knowledge to new domains within neuroscience; has skills and knowledge to search for relevant data on his/her own scientific question, and can critically assess published data within the theoretical framework chosen for a particular project.
- The student can carry out research independently and knows how to formulate and express results and interpretations of the research outcomes.
- The student knows how to participate in discussions, put forward his/her results both in a constellation of peers as well as for lay-people.
- The student has proven capabilities to contribute to the generation of new idea/concepts/technical approaches to experimental research questions.
- The student can summarize, document, report, and reflect on own findings.

#### *Learning outcome for Master of Science in Neuroscience*

<b>After completion of the programme the student</b>	<b>Knowledge</b>	<b>Skill</b>	<b>General competence</b>
has in depth insight in basic brain structure and function reaching from the molecular to systems level.	3	1	3
understands how neural systems contribute to sensory experiences, thoughts, emotions, behaviour	2	2	3
can apply and adopt experimental methods to gain new knowledge	2	3	2
can formulate a research question based on adequate insight into current knowledge	3	3	2
is able to report outcomes of research in a coherent oral and written report	3	2	2

1 = elementary; 2 = average; 3 = advanced

### **Target Groups and Admission Requirements**

The master's programme is suitable for students motivated towards research or teaching in Neuroscience in particular or the natural sciences in general. The introduction to experimental and analytical methods is relevant to other academic areas as well. The methodological introduction also provides a good background for positions in public health administration, academic journalism and medical publishing.

Admission to the MSc in Neuroscience requires a bachelor's degree (or an equivalent 3-year education) in biochemistry, biophysics, biology, biomedical science, neuroscience or psychology. Other relevant disciplines (e.g. biotechnology, informatics, mathematics, medicine, movement science, philosophy, radiography) may be accepted after an individual evaluation of the applicant's qualifications. The minimum average grade required is the Norwegian "C".

Applicants are encouraged to include the NTNU-based course NEVR2010 – *Introduction to Neuroscience* as a part of their bachelor's degree. Students who do not have NEVR2010 (or an equivalent background in Neuroscience) when admitted, may be required to follow the NEVR2010 lectures during their first semester of the master's programme.

International applicants need to submit proof of English proficiency (TOEFL, IELTS, APIEL or University of Cambridge test). More details about the language requirements are available at [www.ntnu.edu/studies/langcourses/languagerequirements](http://www.ntnu.edu/studies/langcourses/languagerequirements)

Applicants who are not citizens of the European Union (EU) or the European Economic Area (EEA) need to provide a financial guarantee to get a residence permit in Norway.

*The admission requirements for the MSc in Neuroscience are currently under revision. Updated admission requirements for the academic year 2014/2015 will be published at our webpage ([www.ntnu.edu/studies/msneur/admission](http://www.ntnu.edu/studies/msneur/admission)).*

## Teaching Methods and Learning Activities

The MSc in Neuroscience is a two-year, full-time programme. The teaching includes lectures, laboratory work/demonstrations and supervised project work. The language of instruction is English.

The master's programme has small classes, which stimulates a good study environment. The students contribute to the interdisciplinary environment with their different educational and ethnical backgrounds. Master's thesis projects are offered in multidisciplinary research teams such that students are exposed to and encouraged to participate in collaborative projects. The language of instruction and examinations is English.

Students will get access to high-tech laboratory environments, and modern reading and lecture rooms, computer labs and library facilities at Øya campus in Trondheim. NTNU shares this campus with St. Olav's University Hospital and Sør-Trøndelag University College.

*Soma* is an academic and social organization for master's students at the Faculty of Medicine. Soma runs a buddy programme at the start of the semester, and various events through the academic year. For more information, visit <http://somantnu.blogspot.com/>

## Programme Structure

The master program is made up of the following three components:

- Master's thesis (60 credits)
- Compulsory courses (37.5 credits)
- Elective courses (22.5 credits)

## Master's Thesis

NEVR3901*	Thesis in Neuroscience	60 credits
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\* The course code FY3901 is used by students with a supervisor at the Department of Physics.

## Compulsory Courses

NEVR3001	Basic Neuroscience	7.5 credits (autumn)
NEVR3002	Systems Neuroscience	7.5 credits (autumn)
NEVR3003	Behavioural and Cognitive Neuroscience	7.5 credits (spring)
NEVR3004	Neural Networks	7.5 credits (spring)
Various	Experts in Teamwork	7.5 credits (spring)

## Elective Courses

A selection of suggested elective courses is presented below. Other courses at NTNU or other universities can be approved by the Programme Board on request.

Some of the courses have entry requirements and/or restricted admission. Be sure to check this before you register for a course.

Courses with a course code in the 8000-series are at PhD level, but are open for qualified and motivated master's degree students.

The elective courses should normally be at master's degree level (3000-series or higher). However, if the student lacks appropriate background in areas relevant for the master's thesis, undergraduate courses in biology, chemistry, informatics, mathematics, medicine, physics, psychology or statistics may be accepted as well.

Faculty of Humanities:

FI3107	Biotechnology and Ethics	7.5 credits (autumn)
NEVR3005	Philosophy of Neuroscience	15 credits (spring)

Faculty of Information Technology, Mathematics and Electrical Engineering:

IT3708	Sub-symbolic AI Methods	7.5 credits (spring)
TMA4255	Applied Statistics	7.5 credits (spring)

Faculty of Medicine:

KLH3100	Introduction to Medical Statistics	7.5 credits (autumn)
MOL3001	Medical Genetics	7.5 credits (spring)
MOL3005	Immunology	7.5 credits (autumn)
MOL3008	Analytical Techniques and Instrumentation	7,5 credits (autumn)
MOL3010	Animal Cell Culture	7.5 credits (autumn)
MOL3014	Nanomedicine I – Bioanalysis	7.5 credits (autumn)
MOL3015	Nanomedicine II – Therapy	7.5 credits (spring)
MOL3018	Medical Toxicology	7.5 credits (spring)
NEVR3040	Private Study of Neuroscience I	7.5 credits (both)
NEVR3050	Private Study of Neuroscience II	15 credits (both)
NEVR8001	Brain Metabolism Studied by <sup>13</sup> C Nuclear Magnet Resonance Spectroscopy and Other Methods	7.5 credits (autumn)
NEVR8002	Aspects of Neurobiology	4.5 (both)
NEVR8014	Laboratory Animal Science for Researchers	7.5 credits (autumn)

Faculty of Natural Sciences and Technology:

BI3010	Population Genetics	7.5 credits (autumn)
BI3013	Experimental Cell and Molecular Biology	7.5 credits (autumn)
BI3016	Molecular Cell Biology	7.5 credits (autumn)
BI3018	Patenting and Commercialization of Biotech and Medtech Inventions	7.5 credits (spring)
TBT4145	Molecular Genetics	7.5 credits (autumn)
TFY4265	Biophysical Micromethods	7.5 credits (autumn)
TFY4280	Signal Processing	7.5 credits (spring)
TFY4310	Molecular Biophysics	7.5 credits (autumn)
TFY4320	Medical Physics	7.5 credits (spring)

**Progression**

NEVR3001 and NEVR3002 should be taken during the first semester. NEVR3001 is taught in the first half of the semester, and the final written examination is held in October. NEVR3002 is taught in the second half of the semester and the final written examination is held in December.

NEVR3003 and NEVR3004 should be taken during the second semester. NEVR3003 is taught in the first half of the semester, and the final written examination is held in March. NEVR3004 is taught in the second half of the semester and the final written examination is held in May or June.

The modular course *Information Literacy* is embedded in the four compulsory courses NEVR3001, NEVR3002, NEVR3003 and NEVR3004.

The course *Experts in Teamwork* (EiT) is compulsory for all master's degree students at NTNU, and is taught intensively in the weeks 2, 3 and 4 in the second semester. Read more about EiT here: <http://www.ntnu.edu/eit>

The elective courses are to be taken when convenient for the work with the master's thesis. In the second semester, the student must choose a topic for the thesis. A contract for the master's thesis including a project description is drawn up by the student and his/her supervisor and submitted to the Department of Neuroscience within 15 March. Due to the nature of experimental projects in Neuroscience, it is recommended to work continuously with the master's thesis during the two years of the programme.

#### Model of the MSc in Neuroscience (example):

Year 1		Year 2	
<i>1<sup>st</sup> semester (autumn)</i>	<i>2<sup>nd</sup> semester (spring)</i>	<i>3<sup>rd</sup> semester (autumn)</i>	<i>4<sup>th</sup> semester (spring)</i>
NEVR3001	NEVR3003	Thesis	
NEVR3002	NEVR3004		
Elective course	Experts in Teamwork		
Elective course	Elective course		

Please note that this is only a suggestion. As mentioned above, the student can choose to start with the thesis already in the first year and postpone one or more of the elective courses to the second year.

The student must have passed all examinations in compulsory and elective courses before the thesis can be submitted.

### **Course Descriptions**

See [www.ntnu.edu/dmf/studies/courses](http://www.ntnu.edu/dmf/studies/courses)

## MASTER OF SCIENCE IN URBAN ECOLOGICAL PLANNING

### ADDITIONAL REGULATIONS

<b>Knowledge</b>
<ul style="list-style-type: none"> <li>• Knowledge of two specific, underprivileged neighbourhoods (one in a developing country, the other in a Nordic country), their territorial strength in terms of organisation, resources, skills and access to land, but also their struggle, and changing livelihood conditions.</li> <li>• Experience in how to address both non-planned and planned neighbourhoods in urban centres and fringe areas for the purpose of livelihood improvements, tenure security and urban upgrading in contexts of conflicts of objectives of equity, environmental sustainability and civil society interests.</li> <li>• Understanding of specific cases of building strategic responsibility and action at higher levels of urban governance and management in terms of 'scaling up' local development initiatives.</li> </ul>
<b>Skills</b>
<ul style="list-style-type: none"> <li>• Knowledge of integrated action planning and integrated local planning processes building both on local defined priorities and local ownership and higher levels strategic action.</li> <li>• Competence in applying, examining and analyzing participative tools.</li> <li>• Ability to use geographical information systems (GIS) as an important tool in urban mapping, planning and management.</li> </ul>
<b>General competence</b>
<ul style="list-style-type: none"> <li>• Awareness of the struggle of the urban poor in terms of entitlements to land, work, and participation in the civil society, and overall livelihood improvements.</li> <li>• Understanding of what are contextual and general issues in local and higher level urban transition in both developing and Nordic countries as well as their localised and interrelated nature.</li> <li>• Knowledge on the interface and the potential conflicts between targeted strategies addressing urban poverty and urban environmental strategies.</li> </ul>

#### 1. Learning Goal

The goal of the Masters course in Urban Ecological Planning is to enable the candidates to act as planners in urban settings based on an understanding of the dynamics of urban change in a global context.

The course is grounded in an ideology that focuses on exploring and utilizing contextual knowledge and localized resources while at the same time acknowledging the relational complexity that exist in the urban reality of the developing world. Through a practice oriented learning approach the course adheres to the principles of equity, sustainability and in promoting the interests of the marginalized.

## 2. Course Structure

This is a two year course where each of the four semesters comprises core modules and electives from the natural or social sciences depending on the candidate's interests or qualifications. There are also multidisciplinary courses, "Experts in Team" that may be chosen as electives.

*Semester I:* International 'Field Work and Project' taking place in a third country done in cooperation with students from other international universities and faculties of NTNU.

*Semester II:* Core courses (Urban Ecological Planning; Planning for Sustainability and Development; Research Methods; GIS for Urban Planning).

*Semester III:* Core courses (Planning Theory, Methods) + electives.

*Semester IV:* Master thesis; analyses and final write-up.

Individual study plans for each semester has to be agreed upon with the course coordinator and submitted by deadlines set by the university

## 3. Career Prospects

The course will give the candidate in insight into the dynamics of urban change, and prevalent development challenges of the developing world, and furthermore advise on possible ways of dealing with the constitutive problems and possibilities. The candidate is thus qualified to fill positions within public administration, private and public planning institutions, in private consulting businesses, NGOs, aside from positions in educational institutions. Our candidates have previously settled into all the mentioned positions.

## 4. Entry Qualifications

*1: International Students (excluding students from Nordic countries)* Students are required to have a B.Sc/ B. Engg/ BA university degree preferably in Urban Planning, Architecture or Civil Engineering. Candidates with a BA degree in Social Sciences that are relevant to the field of Planning such as Geography, Sociology, Cultural Studies etc in combination with 2 – 5 years work experience in Urban Planning will also be considered for admission.

*2: Students from Nordic countries:* Equivalent to those for international students. Nordic students may also apply on the basis of exams in relevant areas from the University Colleges (høyskolene).

*English Language Requirements:*

TOEFL Score 500/170

IELTS mark 5.0

## 5. Studies at other universities

Candidates may spend one of the four semesters as exchange student at another university on the condition that the courses taken are equivalent of those taught at our course.



**6. Contacts**

For further information on admission and administrative matters: [studadm@ab.ntnu.no](mailto:studadm@ab.ntnu.no).

For information on academic matters: [hans.skotte@ntnu.no](mailto:hans.skotte@ntnu.no) or  
[hans.c.bjonness@ntnu.no](mailto:hans.c.bjonness@ntnu.no)

## LIST OF SUBJECTS - MASTER OF SCIENCE IN URBAN ECOLOGICAL PLANNING 2013/2014

### Compulsory core courses:

Semester:	Subject no.:	Title:	Note	Autumn	Spring
1.sem	AAR4525	Urban Ecological Planning in Developing Countries. Project work		15 Sp	
1.sem	AAR4816	Urban Ecological Planning. Method		7,5 Sp	
1.sem	AAR4820	Urban Ecological Planning. Theory		7,5 Sp	
2.sem	AAR4944	Planning for Sustainability and Development			7,5 Sp
2.sem		Electives (see list)			7,5 Sp
2.sem	AAR 5305	Urban Ecological Planning in Diverse Cultures			7,5 Sp
2. sem	AAR5250	Preparation for fieldwork			7,5 Sp
3.sem	AAR5200	Processing Field Study Data	1	15 Sp	
3.sem	FP4350	Planning theory and planning process skills		7,5 Sp	
3. sem		Electives (see list)		7,5 Sp	
4.sem	AAR5400	Master In Urban Ecological Planning			30 Sp

### Electives:

Subject no.	Title:	Note	Autumn	Spring
AAR8100	Housing Theory and History	2	7,5 Sp	
GEOG3505	Landscape and Planning	2	15 Sp	
GEOG3506	Geography, Health and Development	1, 2	7,5 Sp	
AAR5270	Globalisation and Urban Development	2	7,5 Sp	
AAR5260	GIS in Urban Planning	3		7,5 Sp

1) The course will not be offered in 2013/2014

2) Autumn:

Elective courses offered during the autumn can only be selected if a study plan tailored to the M.Sc. thesis subject is agreed with the Faculty, and recommended by the M.Sc. thesis supervisor and course responsible.

3) Spring:

Other relevant NTNU courses can be chosen after consultation with the program coordinator

The subject description can be found at <http://www.ntnu.no/studier/sokemne>

# MASTER OF SCIENCE IN SUSTAINABLE ARCHITECTURE

## Towards a zero emission built environment

### ADDITIONAL REGULATIONS

#### 1. Learning Aims

Participants in the international MSc programme for Sustainable Architecture will learn to identify and apply the correct measures and resources to design high-quality, cost effective architecture that contributes towards achieving a zero emission built environment.

In a global and European perspective, buildings are accountable for about 40 % of all GHG emissions. IPCC reports point to measures in the building sector as being the most economical (when compared to other important sectors).

The MSc programme aims to educate and train building professionals in the use and development of competitive methods and solutions for existing and new buildings that will contribute to lowering GHG emissions related to the production, use, management, and demolition of architecture in a life-cycle perspective. The Master programme encompasses residential, commercial and public architecture as well as its effect on the urban and rural built environment.

#### 2. Course Structure

The curriculum consists of 3 consecutive semesters with theory and project courses, and a fourth semester during which the participants write their MSc thesis. Throughout the two years of the MSc programme, a holistic perspective stresses the many architectural expressions and possibilities encompassed within a zero emission built environment. Within each of the theory and project courses, high demands are made towards integrated design strategies to ensure usability and synergy of the design with its surroundings and users. The students are continuously trained in interdisciplinary co-operation in order for them to integrate this integrated design method in their professional practice.

- Semester 1: Concepts and strategies related to energy efficient, sustainable and zero emission buildings and built environment (theory); Climate and Built Form (theory); Project course
- Semester 2: Energy systems and services and their integration in architectural design (theory); Sustainable building materials and components (theory); Project course
- Semester 3: Use and operation of zero emission buildings (theory); Elective Course (theory – to be agreed upon with supervisor and course coordinator); Project course
- Semester 4: Master thesis

#### 3. Career Prospects

The MSc programme in Sustainable Architecture lies in the forefront of research, innovation and implementation related to reducing GHG emissions in architecture which the students will be able to transfer into their practice as building professionals. The

continuous focus on integrated design methodology will enable the students to perform in any building design team, both as co-worker and leader.

The programme's close link to the interdisciplinary Research Centre on Zero Emission Buildings ensures close contact with State-of-the-Art research and practice in Norway and abroad with whom the students will be in contact during their education: education and research institutions; producers of materials and products for the building industry; contractors, consultants, architects; trade organisations; public administration; public and private construction and property management; and users. Among the international partners of the Research Centre are VTT (Finland), Chalmers (Sweden), Fraunhofer (Germany), TNO (The Netherlands), LBL and MIT (USA), University of Strathclyde (Scotland), and Tsinghua University (China).

#### **4. Entry Qualifications**

A 3-year Bachelor Degree in Architecture, Engineering or Urban Planning. Students with a background in other relevant fields may be considered for admission as well, after discussion with the MSc coordinator and Advisory Board.

English Language Requirements: TOEFL Score 500/170; IELTS mark 5.0

#### **5. Studies at other universities**

Students may spend one of the four semesters as exchange student at another university on the condition that the courses taken are equivalent to the programme at NTNU.

#### **6. Contacts**

For further information on admission and administrative matters: [studadm@ab.ntnu.no](mailto:studadm@ab.ntnu.no).

For information on academic matters: [annemie.wyckmans@ntnu.no](mailto:annemie.wyckmans@ntnu.no).

## LIST OF SUBJECTS - MASTER OF SCIENCE IN SUSTAINABLE ARCHITECTURE 2013/2014

Semester	Subject no.:	Title:	Note	Autumn	Spring
1 <sup>st</sup> semester	AAR4532	Climate and Built Form Design Project		15 Sp	
1 <sup>st</sup> semester	AAR4833	Concepts and Strategies in Sustainable Architecture		7,5 Sp	
1 <sup>st</sup> semester	AAR4832	Climate and Built Form		7,5 Sp	
2 <sup>nd</sup> semester	AAR4546	Design of Zero Emission Buildings			15 Sp
2 <sup>nd</sup> semester	AAR4817	Zero Emission Building Theory			7,5 Sp
2 <sup>nd</sup> semester		EiT			7,5 Sp
3 <sup>rd</sup> semester	AAR4616	Integrated Energy Design Project	1	15 Sp	
3 <sup>rd</sup> semester	AAR4926	Integrated Energy Design Theory		7,5 Sp	
3 <sup>rd</sup> semester		Elective Course		7,5 Sp	
4 <sup>th</sup> semester	AAR4993	Master Thesis			30 Sp

### Electives:

Subject no.	Title:	Note	Autumn	Spring
Recommended course				
AAR8330	Zero Emission Buildings	1	7,5 Sp	
The student may also choose among the following optional courses				
BI2050	Biological Resources		7,5 Sp	
AAR4850	Light in Lighting		7,5 Sp	
AAR4863	Digital Modeling and Fabrication		7,5 Sp	
TMM4225	Engineering Collaboration in Distributed Teams		7,5 Sp	
FP4100	Arkitektur og stedsforming	2	7,5 Sp	
EP0100	Energifremtider og miljøvisjoner	2	7,5 Sp	
TBA4155	Prosjektplanlegging og analyse	2	7,5 Sp	
TBA4160	Bygningsfysikk, grunnkurs	2	7,5 Sp	
TBA4135	Organisasjon og økonomi i BA-prosjekt	2	7,5 Sp	
GEOG1000	Menneske og sted I	2	7,5 Sp	
TIØ4258	Teknologiledelse	2	7,5 Sp	
TPD4142	Designtenkning	2	7,5 Sp	
FI1105	Etikk	2	7,5 Sp	

The subject description can be found at <http://www.ntnu.no/studier/sokemne>

- 1) The course will not be offered in 2013/2014
- 2) Offered in Norwegian

## MASTER IN SUSTAINABLE URBAN TRANSITIONS 2013/2014

Nordic master programme.

### 1 Goals

The Nordic Master Programme in Sustainable Urban Transitions (NMP SUT) is a Nordic double degree master programme which has been developed by the Nordic Five Tech (N5T) collaboration. N5T is an alliance of the five leading technical universities: Aalto University (Aalto), Chalmers University of Technology (Chalmers), Royal Institute of Technology (KTH), Norwegian University of Science and Technology (NTNU) and the Technical University of Denmark (DTU). The goal of the N5T alliance is to utilize shared and complementary strengths and create synergy within education, research and innovation.

#### *Perspectives*

These different fields of application forms a new joint subject area: planning and design for Sustainable Urban Transitions, where systems thinking, participative and scenario approaches, risk reduction, research by design and generative planning are key concepts. Within this subject area, the aims of the programme are to:

- Provide opportunities for joint learning and understanding of urban planning, design and management as highly complex transition processes, laden with both short-term and long-term uncertainties.
- Support integrated learning and capacity building targeting the variety of involved professionals.
- Show how sociotechnical systems theory, participative and scenario approaches, area-based planning and practice-based research are key concepts in sustainable urban transitions.
- Provide opportunities for learning in different contexts (North and South) and fields of application at the five participating universities, exploiting the strong complementary specialties of the N5T partners to foster highly qualified candidates for public administration, industry and research within sustainable urban transitions.
- The programme is active at four different levels of urban transitions: individual inhabitants/users, neighbourhoods, infrastructural systems, and urban regions. These levels are represented by the programme's five study tracks and the learning outcomes differ depending on study track. Details of the programme's learning outcomes are to be found in the study track descriptions.

#### *Level*

The NMP SUT is a two-year 120 ECTS Nordic double degree master programme coordinated by Chalmers and based on the particular expertise of the participating universities. In the double degree programme students study one year at two different universities following a Year one university/Year two university pattern:

- Year one university, 1st and 2nd semesters
- Year two university, 3rd and thesis semesters

The length of the study period in each university corresponds to 60 ECTS.

#### *Relevance*

Since continued urbanization will be a major trend globally in the coming decades (from today's three billion to the anticipated six billion urban inhabitants by 2050), future career opportunities for successful NMP SUT students cover a wide field of potential employers and/or clients in both OECD and non-OECD countries. The five study tracks reflect different but equally valid ways to address critical challenges linked to urban transitions.

Career opportunities will thus be found in the public sector (agencies for urban/regional planning, management, and governance), in development institutions (local and international), and in both NGOs and consultancy firms active in the field of urban transitions. As the NMP SUT is integrated into the research environments at the five participating universities it also provides a solid platform for pursuing an academic career.

## **2 Learning outcome (Urban Ecology)**

After completing this study track, the candidate should have:

### *Knowledge*

- Knowledge of two specific, underprivileged neighbourhoods (one in a developing country, the other in a Nordic country), their territorial strength in terms of organisation, resources, skills and access to land, but also their struggle, and changing livelihood conditions.
- Experience in how to address both non-planned and planned neighbourhoods in urban centres and fringe areas for the purpose of livelihood improvements, tenure security and urban upgrading in contexts of conflicts of objectives of equity, environmental sustainability and civil society interests.
- Understanding of specific cases of building strategic responsibility and action at higher levels of urban governance and management in terms of 'scaling up' local development initiatives.
- Knowledge of integrated action planning and integrated local planning processes building both on local defined priorities and local ownership and higher levels strategic action.

### *Reflection*

- Competence in applying, examining and analyzing participative tools.
- Ability to use geographical information systems (GIS) as an important tool in urban mapping, planning and management.

### *Practice*

- Awareness of the struggle of the urban poor in terms of entitlements to land, work, and participation in the civil society, and overall livelihood improvements.
- Understanding of what are contextual and general issues in local and higher level urban transition in both developing and Nordic countries as well as their localised and interrelated nature.
- Knowledge on the interface and the potential conflicts between targeted strategies addressing urban poverty and urban environmental strategies.

## **3 Target group**

The programme is open to students with a bachelor in Architecture, Landscape Architecture, Planning (such as Physical Planning and Human Geography with a profile

in planning), and Engineering. However, depending on their background (bachelor degree and professional experiences) students can only apply to certain study tracks and, hence, to certain universities (see diagram here). There are a limited and predefined number of student places in each study track and for each category of student (i.e. Architecture, Landscape Architecture, Planning, and Engineering).

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#### **4 Staff competences**

Will be based on the current staff at the Department of Urban Design and Planning with competence within:

- Process knowledge, urban governing, governance
- Urban fabric and infrastructure
- Transportation
- Urban design and land use planning
- GIS
- Planning theory
- Landscape architecture (lacking competence)

Need competence from planning in developing countries within informal processes.

#### **5 Education /learning**

The programme will start autumn 2012. A group of 30 students will be distributed between the universities. NTNU will get 6-8 new students every year.

#### **6 Funding**

By the time there is no special funding for the programme.

#### **7 Research**

Both the topic, Sustainable Urban transitions, and the cooperation with the leading Nordic universities, make an excellent basis for research within the European research programmes, national programmes and others.

#### **8 Location**

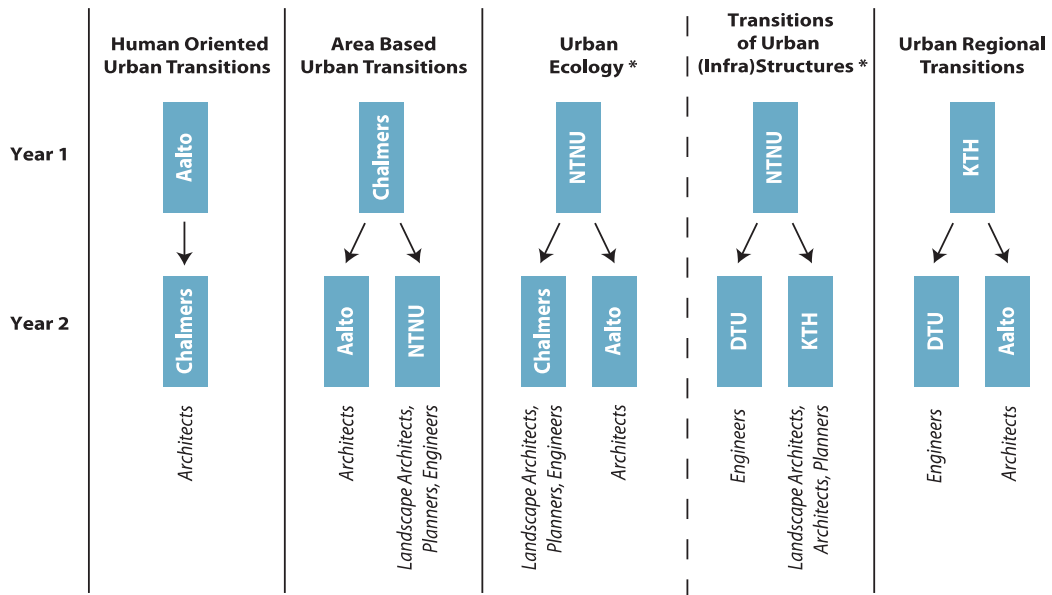
Chalmers will coordinate the programme and the students will at NTNU be distributed at existing courses with MUEP, MFP and MA.

The programme will be an interesting basis for a broad, multidisciplinary research programme within Sustainable urban development.

**More information:** <http://www.nmpsut.org/>



Possible convergence: **Sustainable urban development and transition**



\* Only offered every other year

### Study track: Area Based Transitions (every Year)

Semester:	Subject no.:	Title:	Note	Autumn	Spring
<b>University 1: Chalmers</b>					
1.sem	AMU018	Sustainable Development and the Design Professions		7,5	
1.sem	ARK172	Planning and Design for Sustainable Development in a Local Context		22,5	
2.sem		Elective Course (see list)			7,5
2.sem		Elective Design Studio (see list)			22,5
<b>University 2: NTNU</b>					
3.sem	AAR4874	Theories and Methods for Master Thesis		7,5	
3.sem	FP4350	Planning theory and process skills		7,5	
3.sem	AAR5270	Globalisation and Urban Development		7,5	
3. sem		Elective course		7,5	
4.sem	AAR5410	Master Thesis			30

### Electives

Semester:	Subject no.	Title:	Note	Autumn	Spring
<b>Elective Courses – Chalmers</b>					
2.sem	ARK176	Design Systems 7,5 ect			7,5
2.sem	ARK146	Architectural Conservation and Urban Transformation 7,5 ect			7,5
2.sem	VVT105	Geographical information systems (GIS)			7,5
<b>Elective Design Studio – Chalmers</b>					
2.sem	ARK161	Reality Studio Kisumu at Lake Victoria, Kenya			22,5
2.sem	ARK347	Architectural Conservation and Urban Transformation			22,5
<b>Elective Courses – NTNU</b>					
3. sem	AAR8100	House Theory and History	1	7,5	

- 1) Other relevant NTNU courses can be chosen after consultation with the program coordinator

### Study track: Urban Ecology (every other year)

Sem	Subject no.	Title	Autumn	Spring
<b>University 1: NTNU 2013/2014</b>				
1.sem	AAR4525	Urban Ecological Planning in Dev. Countries (project)	15	
1.sem	AAR4820	Urban Ecological Planning in Dev. Countries (theory)	7,5	
1.sem	AAR4816	Urban Ecological Planning in Dev. Countries (method)	7,5	
2.sem	AAR5305	Urban Ecological Planning in Diverse Cultures		7,5
2.sem	AAR5250	Preparation for Fieldwork: Research Methods		7,5
2.sem	AAR5260	GIS in urban planning		7,5
2.sem		Electives:		
2.sem	AAR4944	Urban planning for Sustainability and Development		7,5
2.sem	AAR4912	Experts in Teamwork – Sustainable Architecture		7,5
<b>University 2: Chalmers 2014/2015</b>				
3.sem	ARK322	Suburbs: Design and Future Challenges	22,5	
3.sem	ARK460	Advanced theory and methodology – master's thesis preparation course	7,5	
4.sem		Master thesis		30
<b>University 2: Aalto 2014/2015</b>				
3.sem		Urban Laboratory	10	
3.sem		Elective courses (see list)	20	
4.sem		Master thesis		30

### Electives

Sem	Subject no.	Title	Note	Autumn	Spring
<b>Elective Courses – Aalto</b>					
3.sem	A-36.3330	Urban Renewal, studio		10	
3.sem	A-36.3504	City in Transition Theory		5	
3.sem	Maa-20.3510	Strategic Urban and Regional Planning		4	
3.sem	21 A00310	Introduction to Management		6	
3.sem	21 E80000	Gender, organizations and management		6	
3.sem	21 E10000	How to change the world: Innovation towards sustainability		6	
3.sem	07124	Context / Upgrading a Neglected Space		12	
3.sem	10157	Designing Services		12	

### Study track: Transitions of Urban Structures (every other year)

Sem	Subject no.	Title	Note	Autumn	Spring
<b>University 1: NTNU 2014/2015</b>					
1.sem	AAR4515	Sustainable urban design - project		15	
1.sem	AAR4905	Urban LAB		7,5	
1.sem	FP4350	Planning theory and process skills		7,5	
2.sem	AAR4225	Integrated land use and transportation planning			7,5
2.sem	AAR4605	Urban Design and Architecture			7,5
2.sem	AAR5260	GIS in Urban planning			7,5
2.sem		Electives			7,5
<b>University 2: KTH 2015/2016</b>					
3.sem		Urban Theory, Advanced Course		7,5	
3.sem		Social and Cultural Issues in Planning		7,5	
3.sem		Elective Course (see list)		15	
4.sem		Master's Thesis			30
<b>University 2: DTU 2015/2016</b>					
3.sem	42273	Urban Planning and Sustainable Urban Development		10	
3.sem	42278	Urban Technology and Management		10	
3.sem	42401	Introduction to planning		5	
3.sem	42543	Management of Change		5	
4.sem		Master thesis			30

### Electives

Sem	Subject no.	Title:	Note	Autumn	Spring
<b>Elective Course – NTNU 2014/2015</b>					
2.sem	AAR4912	Experts in Teamwork – Sustainable Architecture			7,5
2.sem	AAR4944	Urban planning for Sustainability and Development			7,5
<b>Elective Course – KTH 2015/2016</b>					
3.sem	AG2129	Project Sustainable Urban Planning: Strategies for urban & regional development		15 ect	
3.sem	AG2805	Project Sustainable Urban Design: Public Places and Spaces		15 ect	

## MASTER OF FINE ART

### ADDITIONAL REGULATIONS

<p><b>QUALIFICATIONS FRAMEWORK - KIT (the Trondheim Academy of Fine Art)</b>  <b>2-year study program at master's degree level.</b></p>
<p><b>Knowledge:</b></p> <p>Be capable of using his/her knowledge to develop his/her artistic practice in an independent and innovative way. Have advanced knowledge of relevant international art and art theory; be able to develop, communicate and reflect on his/her own artistic practice and to place this practice in a historical, theoretical and social context</p> <p>Have thorough knowledge of the disciplines in the arts based on international artistic practice and leading research in art theory within the subject area.</p> <p>Develop his/her knowledge of the materials and methods used in the visual arts disciplines and develop critical reflection, making it possible to place his/her artistic practice in an international artistic context.</p>
<p><b>Skills:</b></p> <p>Be capable of analysing his/her own artistic processes with regard to implementation, presentation and communication.</p> <p>Be able to make a professional assessment of artistic challenges as well as practical and theoretical issues, and on that basis make independent choices reflecting a high level of competence in the subject area.</p> <p>Develop his/her practice, method and professionalism so that he/she achieves a level of artistic accomplishment that is independent and has the potential to be sustained over time.</p> <p>Demonstrate the ability to express new problem formulations independently and creatively; contribute to the development of knowledge, and be able to develop new modes of expression.</p>
<p><b>General competence:</b></p> <p>Be capable of navigating in a professional way through complex and unpredictable processes in the visual arts.</p> <p>Develop an in-depth understanding of relevant artistic, social and ethical aspects in the role of art and establish positions of responsibility.</p> <p>Understand the function of art in community building as an important part of cultural life.</p> <p>Be able to initiate and implement professional and interdisciplinary cooperation and to undertake professional responsibility.</p> <p>Demonstrate the ability to identify his/her need for further knowledge and to take responsibility for developing his/her knowledge.</p>

#### 1 Learning outcome

Development of artistic practice and contextualization of the work. From research to concept development, reflection, articulation and realization.

Reflection about contemporary discourse in the field of visual arts.

The innovative two-year graduate program trains students to interrogate and evaluate

art and its social and environmental (spatial) implications.

## 2. Main profile/program of study

The MFA course will focus on the articulation and communication of project ideas to support the artistic development of the MFA student. In this course research / theory is addressed as much as studio practice to learn to contextualize and to examine ones project / work within historic and contemporary parameters of cultural productions. Projects evolve through stages of conceptual and material development to final presentation and critical discussions. This is followed up in our regular class meetings. The objective is to focus and develop (within the time period of max. two years of study) the project / work to be presented and defended in the final MFA exhibition / exam.

### Semester structure, 1st and 2nd semester

Each academic year consists of 2 semesters. Each semester consists of 30 credits

- a) **MFA course** – theory and practice / mandatory with focus on the articulation and communication of project ideas to support the artistic development of the MFA student.
- b) **Lecture program.** Lectures by the professors and visiting lecturers. Including Art and Common Space
- c) **Tutorials** offered by all Professors and guest tutors, minimum 2 tutorials with main tutor per term

In the 2nd semester, MFA master's students are to complete "Experts in Team", which is a compulsory course.

### Semester structure, 3rd semester

- a) **MFA course** – theory and practice / mandatory Presentation and articulation of project development / including thesis formulation. Thesis development and project articulation with the support of advises by all teachers.
- b) In this term the 2 MFA student will have to develop their documentation of work in form of a portfolio and / or website.
- b) **Tutorials** offered by all Professors and guest tutors, minimum 2 tutorials with main tutor per term.

### Semester structure, 4th semester

a) **MFA course** – theory and practice / mandatory with focus on the articulation and communication of project ideas to support the artistic development of the MFA student. In this course research / theory is addressed as much as studio practice to learn to contextualize and to examine ones project / work within historic and contemporary parameters of cultural productions.

Realization of MFA project and thesis advised by several teachers including teacher from MFA course, Art & Common Space and Contact teacher.

In this term the 2 MFA student will have to collaborate together on Exhibition Design, Catalogue Production (digital or analogue)

At the end of the term the students participate in the MFA Exhibition (venues vary) and

defend their works in front of 2 x teachers of KiT (one is the contact teacher) 2 x External Reviewers (one cross-disciplinary from NTNU / one external from the fields of Visual Arts)

b) **Production** of Catalogue and preparation of Seminar or side Program

c) **Tutorials** offered by all Professors and visiting tutors, minimum 2 tutorials with main tutor per term

Art and Common Space is an interdisciplinary project for art and architecture students, which explores the relationship between art and public spaces through presentations, discussions, and practical projects.

The subject is comprised of studies of art and architecture in the production of common/public space, both in physical, philosophical, and psychological terms. As well as examining traditional public spaces there is another dimension to the course in that it attempts to re-think common space/temporality in new and experimental ways. Each semester a particular topic is chosen through which to make enquiries: for instance 'nature', 'science', 'collaborations', 'futurity' etc. The aim is to generate meeting grounds between architecture and art students contributing to a deeper understanding of the specific qualities and aesthetic demands within both fields.

### 3. Contact information for the program

For information about the program, see <http://www.ntnu.edu/studies/mfa>

### 4. Admission requirements

For admission to the MFA program, qualifications equivalent to a Bachelor of Fine Art are required. This means that the applicant has developed independent artistic activity at the time of admission. Applicants are evaluated based on submitted documentation of artistic works and a written motivation or project description for the program of study.

Deadline for applications 1 February

### 5. General regulations regarding course options / individual education plan

For students who are admitted to programs of study consisting of 60 credits or more, an individual education plan must be drawn up between the student and the Faculty by the end of the first semester. An individual education plan is a mutual agreement between the individual student and NTNU. The deadline for confirmation of the individual education plan is 15 September for the autumn semester and 15 February for the spring semester. Selection of courses for each year of study takes place electronically through registration of the individual education plan on Student Web.

### 6. Deadlines

#### General deadlines for the academic year

15 September Deadline for confirmation of the individual education plan in the autumn semester and registration for examinations – for students in the first and third semester – compulsory participation in "Open Academy" with subsequent group review.

15 February Deadline for confirmation of the individual education plan in the spring semester and exam registration –

2nd semester – compulsory participation in semester exhibition with subsequent group review.  
4th semester Participation in MFA exhibition.

## 7. Experts in Team

The aim of the interdisciplinary project course Experts in Teamwork (EiT) is to prepare students for interdisciplinary cooperation in professional life. Students will be given training in applying their specialized knowledge to professional challenges in society.

Students will develop insight, skills and attitudes enabling the student team to communicate professionally and solve an interdisciplinary problem. Each student enters the teamwork as an expert in his or her field of expertise. Through teamwork, students will develop insight into their own academic competence and team behavior, and will be able to use this insight in cooperation with others. Experts in Team (EiT) is compulsory.

More information about Experts in Team is available at the website for the course:  
<http://www.ntnu.edu/eit>

## 8. Master's Exhibition

The MFA program ends with an exhibition with a catalogue and Internet presentation.

## 9. Exchange program

It is possible to apply for an exchange program in the spring semester of the first year.

For more information about studying abroad during the exchange program, see  
[http://www.ntnu.no/studier/studier\\_i\\_utlandet](http://www.ntnu.no/studier/studier_i_utlandet) or contact the administration at KIT.

## 10. Academic Calendar 2013-2014

Before each semester, a provisional semester schedule is posted on our website  
[www.kit.ntnu.no](http://www.kit.ntnu.no)

### Autumn semester

Enrolment ceremony	14 August
First common information meeting	27 August
Introductory workshop	28, 29 and 30 August

Open Academy - semester examination 6- 9 December

Review – semester examination 10, 11 and 12 December

Weekly timetables are prepared in time for the information meetings at 13:00 every Monday. All students are expected to attend these meetings.

### Spring semester

Starting date	2 January
First common information meeting	7 January
Semester exhibition with review	8, 9 and 10 April



BFA Exhibition Opening	20 April to 5 May
MFA exhibition Opening	11 May to 2 June

Weekly timetables are prepared in time for the information meetings at 1300 every Monday. All students are expected to attend these meetings.

**LIST OF SUBJECTS – MASTER OF FINE ART 2013/2014**  
**OBLIGATORY COURSES**

**1ST YEAR**

Sem	Subject no.:	Subject		autumn	spring	Sum
<b>Autumn alternative 1</b>						
1. sem	BK3150	Advanced Artistic Work 1A		30		30
<b>Autumn alternative 2</b>						
1. sem	BK3161	Advanced Artistic Work 1C		7,5		7,5
1. sem	BK3171	Art and Common Space - Theory I		7,5		7,5
1. sem		Elective course		15		15

<b>Spring alternative 1</b>						
2. sem	BK3250	Advanced Artistic Work 2 A			22,5	22,5
2. sem		EiT *			7,5	7,5
<b>Spring alternative 2</b>						
2. sem	BK3221	Art and Common Space – Theory 2			7,5	7,5
2. sem		Elective course			15	15
2. sem		EiT *			7,5	7,5

**2nd year (2014/2015)**

<b>Autumn alternative 1</b>						
3. sem	BK3355	Advanced Artistic Work 3A	1	30		30
<b>Autumn alternative 2</b>						
3. sem	BK3361	Advanced Artistic Work 3C	1	7,5		7,5
3. sem	BK3371	Art and Common Space - Theory 3	1	7,5		7,5
3. sem		Elective course	1	15		15

4. sem	BK3400	Advanced Artistic Work 4	1		30	30
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**Elective courses - Master of Fine Art**

1. sem	BK3130	Advanced Artistic Work 1B		15		15
1. sem	BK3170	Art and Common Space 1		15		15
2. sem	BK3260	Advanced Artistic Work 2B			15	15
2. sem	BK3220	Art and Common Space 2			15	15
3. sem	BK3360	Advanced Artistic Work 3B	1	15		15
3. sem	BK3370	Art and Common Space 3	1	15		15

1) The course will not be offered in 2013/2014

## MASTER OF SCIENCE IN BIOTECHNOLOGY

Gradsnavn: Master of Science in Biotechnology  
Programme code: MSBIOTECH

The 2-year biotechnology Master of Science study is interdisciplinary at several levels. First, the programme is a collaboration between the Department of Biology and the Department of Biotechnology. The courses within the programme reflect this interdisciplinary, as the development of knowledge and skills is focusing on thorough knowledge about basic biological processes, available technologies to study such processes, and knowledge-based approaches to modify or optimise processes in order to tackle major societal, environmental or sustainability problems.

### Learning outcomes

#### MSc Biotechnology, Learning Objectives

*As a MSc student in Biotechnology you get bio molecular knowledge and analytical skills at an advanced level. The program emphasises advanced biochemical and biological studies. You will acquire the skills to qualify for a broad range of positions in research, industry, consultancy, education and public administration, or for further education in a doctoral program. You can in your thesis address a broad range of fields including Molecular biology, Systems biology, biopolymer chemistry, marine biochemistry, environmental biotechnology, food science, microbiology, microbial genetics, molecular biology and systems biology depending on your background and interests.*

### Knowledge

The MSc graduate in Biotechnology has:

- Knowledge of the leading edge in a chosen specialized area of biotechnology, based on own research experience from a master's project and international literature.
- State of art knowledge about various methodological and analytic approaches that are used within the specialization.
- In-depth knowledge in the chemical structure and function of biomolecules, metabolism in the cell, knowledge of the concepts of molecular genetics and biosynthesis of proteins, and a good theoretical and practical insight into methods used to obtain this knowledge.
- Knowledge of the relationship between structure and function at organ and/or organism level, of important cell biological communication principles and processes, and how they are regulated.

### Proficiency/Skills

The MSc graduate in Biotechnology:

- Is able to independently carry out a complete scientific work process, including the understanding of theoretical background, hypothesis generation, collection and analysis of data, and interpretation and presentation of results.
- Has high competence and multidisciplinary project experience within selected topics related to biotechnology and ability to contribute in a multidisciplinary team.
- Is able to evaluate methods and results within the field of specialization critically.
- Is able to evaluate and apply relevant theory, methods and analytic approaches within the specialized field of biotechnology, including statistical methods.

- Is able to analyze relevant issues in cell and molecular biology Implement knowledge from several research fields and disciplines.

### General competence

The MSc graduate in Biotechnology

- Can assess and predict the technological, ethical and social effects of their own work /disciplines and of biotechnology in general.
- Acknowledges health, safety and environment (HSE) issues in handling chemicals and biological materials; understands the environmental impacts associated with the activity; performs risk assessments and is familiar with safety instructions in his/her subject area.
- Is able to work both independently or in groups on complex projects that require collaboration across disciplines.
- Can communicate scientific results to the general public and experts by writing well-structured reports and contributions for scientific publications and posters, and by oral presentations.

### Admission requirements

One of the following requirements has to be fulfilled to qualify for admission to the programme

- BSc in cell- and molecular biology,
- BSc from Norwegian university colleges within bioengineering (bioingeniørfag)
- BSc in food technology (matteknologi/næringsmiddelfag),
- An education which corresponds to 3 years of study at university level within the field of biotechnology or biochemistry.
- BSc in other related areas may be considered on an individual basis.

### Study plan

There are two main components in the Master's programme:

- Master's thesis (60 ECTS credits)
- Theoretical and methodological courses, compulsory and optional courses (60 ECTS credits)

Semester	7,5 ECTS	7,5 ECTS	7,5 ECTS	7,5 ECTS
4. Spring	<b>BI3091/ BT3091 Special Syllabus</b>	Master thesis		
3. Autumn	<b>BI3016 Molecular Cell Biology</b>	Master thesis		
2. Spring	<b>Experts in Teamwork</b>	Optional course	Master thesis	
1. Autumn	<b>TBT4145 Molecular Genetics</b>	Optional course	Optional course	Optional course

Compulsory courses (30 ECTS credits):

- TBT 4145 Molecular Genetics
- Experts in Teamwork
- BI3016 Molecular Cell Biology
- BI3091/ BT3091 Special Syllabus (BI3091 Special syllabus exam (and similar special curriculum courses) can be held together with the final master exam or at an earlier stage in the master programme.)

At least two of the following courses must to be selected from the following list:

Autumn:

BI 3013 Experimental Cell- and Molecular Biology	7,5 ECTS
BI3019 System biology; Resources, Standards, Tools	7,5 ECTS
TBT4135 Biopolymers	7,5 ECTS
TBT4505 Biotechnology Specialization Course	7,5 ECTS
BI3071 Advanced Ecotoxicology	7,5 ECTS
BI3072 Environmental toxicology	7,5 ECTS
BI3075 Experimental toxicology	7,5 ECTS

Spring:

BI3018 Patentation and Commercialization of Biotech and Medtech Invention,	7,5 ECTS
TBT4125 Food Chemistry	7,5 ECTS
TBT4130 Environmental Biotechnology	7,5 ECTS
TBT4165 Systems Biology and Biological Networks	7,5 ECTS
BI3073 Genetic toxicology	7,5 ECTS

In addition we recommend the following courses

BI2012 Cell Biology	Spring	7,5 ECTS
BI2015 Molecular Biology, lab.course	Autumn	7,5 ECTS
BI2022 Plant growth and Development	Autumn	7,5 ECTS

The following courses can also be chosen, but are not planned according to fit in the programme (timetable and examination date)

FI3107 Biotechnology and Ethics	7,5 ECTS
MOL3005 Immunology	7,5 ECTS
MOL3014 Nanomedicine I: Bioanalysis	7,5 ECTS
MOL3015 Nanomedicine II: Therapy	7,5 ECTS
MTEK3001 Applied Bioinformatics and Systems Biology	7,5 ECTS

The normal workload for a full-time student for one academic year is 60 ECTS credits.

The programme also offers the students the opportunity to study one semester abroad. We recommend that this is done in the 2<sup>nd</sup> semester (application deadline 1.st October). At least 3 of the courses taken during the master's degree have to be NTNU courses. At least 30 ECTS, in addition to the course Experts in Teamwork, should be covered by courses on a master level. Not more than 30 credits of Special syllabus can remain  
Deadline for handing in the Master thesis is the 15<sup>th</sup> of May; deadline for the exam is 15<sup>th</sup> of June in the 4<sup>th</sup> semester.

## Master Thesis

The Department of Biology and the Department of Biotechnology will give the student opportunities to choose between wide varieties of master thesis, covering various aspects from human health to food chemistry. In this way the programme ensures that all students, despite various educational backgrounds, are given suitable master thesis that connect to and builds directly on their previous education.

Master's thesis can be linked to on-going research in Molecular Biology, Biopolymer chemistry, Microbiology and Molecular Genetics, Systems Biology, Bioinformatics, Microarray-

based and other genomics data production technologies, knowledge gathering and modelling of biological processes, Food Chemistry, and Environmental Biotechnology.

The student will be part of active research groups working with research themes that include the analysis of basic developmental processes and biochemical processes in plants; characterization of marine algae to lay the foundation for biotech applications in the fields of energy production, CO<sub>2</sub> capture, materials and feed; the study of fundamental processes that link quality of food and human metabolic health; the exploitation of software tools and knowledge bases to integrate and simulate biological processes in the computer; the use of microbial communities for production of renewable energy and for water treatment; molecular genetics and biochemistry of antibiotic biosynthesis in marine bacteria and genome-based bioprospecting for new antibiotics; structure-functional characterization of bioactive molecules derived from bioprospecting studies; quality of food linked to the biochemical processes in the raw material and changes during storage and processing.

### **Career prospects**

Graduates of the Masters programme will be internationally qualified for a wide range of positions both in industry and research related to bio- and medical technology, as well as for further doctoral studies. Other areas of employment are in the biotechnological and pharmaceutical industry, i.e. in connection with development of therapeutic products, methods of analysis and kits, along with improving products in agriculture and aquaculture.

A number of students, mainly former Bioengineers, have got leading positions in laboratories, or they are teachers in Medical technical teaching institutions. After graduating, all the students independent of their educational background, are qualified for a wide range of positions in public and government institutions, in research positions or research support in universities and private research institutes, hospitals and government institutions like Folkehelse, Veterinærinstituttet and Næringsmiddeltilsynet, and they also have competence within the area of risk assessment (REACH).

Further information: <http://www.ntnu.edu/studies/msbiotech>

## **A) Information about the Master's Study**

### **Workload and Structure**

The programme requires two years of full-time study, beginning with the autumn term (medio August). The normal work load for a full-time student for one academic year is 60 ECTS credits.

The Master's study consists of two parts:

1. A written thesis of the project (Master's thesis). The extent of the assignment should correspond to a work load of 60 credits. The work on the thesis is time limited. The thesis has to be handed in within May 15th of the 2nd year.
2. An approved selection of courses, of a minimum of total of 60 credits, from what (at least) 30 credits must be courses at 3000-level (master level) (UTF§14.1).

### **Master's agreement**

Every master student has to make a Master's agreement. This agreement comprises your syllabus and master project together with regulations for the counseling given during the master's study. The subjects, compulsory or elective, stated as syllabus in your Masters Agreement cannot be changed. If there for serious reason develops a need for change, the Masters Agreement must be revised. The supervisor, the responsible institute and the student must agree upon the revision and the new Agreement filed.

## The Master's thesis

The Master thesis should be developed as your own original work (with some support from your adviser). Any quotation, use of data, information etc. from other sources (including the scientific literature and your fellow students) should therefore be carefully listed and included in the reference list of your thesis, according to best practice within your field of study.

## Submission and Examination

The student has to:

- Register for the final master's degree exam (through STUDWEB) within February the 15<sup>th</sup> of the 2<sup>nd</sup> academic year
- Apply for approval of your [individual special syllabus](#) if your Masters Agreement demands a special syllabus. It is important that this is done well in advance of the examination. A study committee will evaluate the syllabus, and if it is not accepted, you must change it. Your supervisor must approve and sign the form. The syllabus should be a minimum of 50 pages per credit.
- Hand in the thesis (within the deadline given, see below) for print through [DAIM](#). The Department will give you 5 copies of the thesis.

In addition to the judgment of thesis, the candidate will have an oral exam consisting of:

- A conversation on/presentation ("defense") of the research assignment (the master's thesis)

Examination on the theoretic syllabus of the advanced subjects which has previously not been evaluated during the study (at least 7,5 credits, preferentially individual special syllabus). All exams, except the Individual Special Syllabus (if any) have to be passed before the date of the final Master's Degree exam, unless otherwise stated in your Masters Agreement.

- A grade is given for every course / special syllabus that constitutes a part of the exam.

## Important deadlines

- **15th of October (1<sup>st</sup> year):** Decide on a Master's project in cooperation with a supervisor.
- **1st of November (1<sup>st</sup> year)** Register your Master's Agreement in DAIM and hand in the project description.
- **15<sup>th</sup> of February (2<sup>nd</sup> year):** Deadline for the signing up of the final Master's Degree exam (through STUDWEB)
- **15<sup>th</sup> of May (2<sup>nd</sup> year).** Deadline for the submission of the master thesis. If the thesis is not submitted within this date the grade "not passed" will be awarded, unless there is an application for extension of the deadline in reasonable time before the deadline. The reasons given in the application must be in accordance with Supplementary Regulations for the Natural Sciences (UTF) § 20.3 and the Examination Regulations at NTNU, § 20. The Supplementary Regulations for the Natural Sciences (UTF) § 7 and the Examination Regulations at NTNU, § 7. See below for further information regarding §7 and §23.3.
- **15<sup>th</sup> of June (approximately, 2<sup>nd</sup> year):** The date for the final Master's Degree exam. (Individual agreement with the respective Department, approximately four weeks after the thesis is submitted).

**Leave of absence from the Master Study (UTF § 7) (extract):**

- a) Leave of absence from the master studies of two years of duration and from the two last year of master studies of five years of duration is normally not granted.
- b) Leaves of absence may nevertheless be granted when applied for and compelling circumstances are present. Such circumstances might be illness (yourself or among close family member) etc.

**Prolongation of the study (UTF § 20.3) (extract):**

The master's thesis is time limited. In case of illness, the deadline for handing in the thesis can be postponed equivalent to the time of absence due to illness. The illness must be documented by medical certificate.

If there is a valid reason for not handing in the thesis in time, one can apply for up to three months prolongation of the deadline. If the thesis is not handed in within the extended deadline, a new extension must be applied for, or else the candidate is regarded failed. Delay of deadline can only be applied for twice.

Valid reasons for postponement (in addition to illness) is teaching, organized student activity, social work and unmerited problems concerning the thesis. Written documentation or statement is required, in addition to a new plan of completion. The Faculty, or Department when given the assignment by the Faculty, determines the application. When the reason for delay is teaching, organized student activity or social work, the extended time given is according to the time spent on these activities.

The agreed delay has no influence on the evaluation of the thesis.

**B) Programme Specific Regulations****Department of Biology**

If the student's main supervisor belongs to the department of Biotechnology, the special syllabus, which has its own course code (BT3091) can be replaced by other courses with exams in the normal exam periods each semester.

For both the Department of Biotechnology and the Department of Biology, the Special syllabus exam (BT3091 or BI3091) (and similar special curriculum courses) can be held together with the final master exam or at an earlier stage in the master programme.

At the start of the 1<sup>st</sup> semester, there is an obligatory introduction course for all master students at the master's programme in Biotechnology.



## MASTER OF SCIENCE IN BIOLOGY

(Including educational cooperation with Nordic Academy of Biodiversity and Systematic Studies (Nabis))

Grade name: 'Master of Science in Biology'

Programme code: MSBIO

### Course descriptions:

MSc in biology has four **specializations**:

- Cell and Molecular Biology
- Physiology
- Ecology, Behaviour, Evolution and Biosystematics
- Biodiversity and Systematics (Nabis)

The specializations are different in terms of compulsory subjects for admission.

The master-degree study has two main components

- Master- thesis (60 credits)
- Theoretical and methodological courses, required and elective courses (60 credits)

A general condition of a 'MSc in Biology' is two years of full-time study where the normal workload for a full-time student for one academic year is 60 credits. Teaching is given in English for all four study areas.

### Learning outcomes 'MSc in Biology':

#### General outcome for all students:

The master-program in Biology provides candidates with research-based, specialized knowledge. Practical projects provides skills and general competence at an advanced level, with the aim of working in research, manufacturing, consulting, education and public administration or for further education in a doctoral program. The Msc-thesis provides expertise in one of the research areas: Cell and molecular biology, physiology, ecology, behavior, evolution and biosystematics

Master candidate shall have acquired upon complete education:

#### Knowledge

- Have expertise and research experience in selected topics in biology, some of these supporting the master project.
- Have a thorough knowledge to the various labor and analytical methods used in the field.
- Have a thorough knowledge to the extent of research being conducted in biology today.
- Have a thorough knowledge and experience of current work- and analyze-methods.

#### Skills

- An experience of written and oral presentations of own research results to specialists and to a broader audience.
- Be able to combine knowledge from multiple disciplines.
- Be able to work with deadlines in relation to a larger project.
- Be able to update themselves on the scientific knowledge of their specialization.

#### General competence

- Be able to critically evaluate scientific work including methods and results.

- Be able to independently carry out a scientific project from initial hypotheses, collecting and analyzing data to an oral and written report in scientific format.
- Be able to obtain and evaluate research information.
- Be able to work in projects, both independently and in collaboration with others, including interdisciplinary teams.
- Be able to analyze key issues within their specialization.
- Be able to communicate extensive scientific work.
- Be able to contribute to innovation within their specialization.
- Have knowledge and experience in risk analysis and management of chemical and biological materials and understand the environmental consequences of these, with a focus on health, safety and environment (HSE).
- Be able to communicate written and orally and in English about academic matters.

### **Learning outcome for individual study specializations:**

#### **Specialization: Cell and Molecular Biology**

The specialization will provide deep molecular understanding of cell biological mechanisms and their regulation. After completing the program, the candidate should have good knowledge of the main methods in cell and molecular biology and the use of modern experimental techniques and apparatus. A scientific investigation is conducted with subsequent written presentation within a particular topic. The candidate shall here display technical expertise and ability to critically evaluate scientific work.

Master candidate shall upon complete education:

#### **Knowledge**

- Have advanced research based knowledge of important biological cell-communication principles and processes and how they are regulated.
- Have advanced knowledge of the cell and molecular biology area.
- Have applied knowledge in cell and molecular biology.

#### **Skills**

- Be able to use and master important techniques to perform independent laboratory work and conduct an independent scientific investigation.
- Can use cell and molecular biological methods in a research paper and give a written presentation of research results.
- Ability to apply existing theories in cell and molecular biology.

#### **Specialization: Physiology**

The specialization provides insight into how animals and plants function in their natural environment. Candidates will acquire thorough understanding of the relationship between specific factors in the external environment and physiological characteristics. A scientific survey is conducted with subsequent written presentation within a particular topic. Here, the candidates should show professional expertise and ability to critically evaluate scientific work.

Master candidate shall upon complete education:

#### **Knowledge**

- Have up-to-date scientific knowledge of how animals and plants function in their natural environment and have acquired a thorough understanding of the relationship between specific factors in the external environment and physiological characteristics.
- Have a thorough knowledge of the field of physiology.
- Be able to analyze and solve physiological problems.

#### **Skills**

- Be able to master important methods (in field and/or laboratory) and to conduct an

independent scientific investigation and subsequent written presentation within a particular topic.

- Be able to analyze theories of physiology.

### **Specialization: Ecology, Behaviour, Evolution and Biosystematics**

The specialization provides a thorough introduction to one of the fields: ecology, behaviour, evolution and biosystematics. Considering the special field, courses will provide a thorough introduction to living organisms' relation to the environment and other living organisms, both within and between species. Specialization gives understanding of micro-and macro-evolutionary processes, and methods used to study them, including methods based on morphological and molecular characters.

Master candidate shall upon complete education

#### **Knowledge**

- Have new knowledge on theoretical and / or experimental aspects of the specialty and broad knowledge in nearby fields.
- Have a thorough knowledge of how biology can yield understanding and solutions to environmental problems.
- Have deep knowledge about biodiversity.
- Be able to understand the evolutionary history and ecological processes.

### **Specialization: Biodiversity and Systematics**

The specialization provides a thorough introduction to biodiversity and systematics including identification skills in one or more groups of organisms. The program will provide an overview of living organisms and kinship / classification between them, species formation and evolutionary history and processes underlying diversity patterns, as well as knowledge about the rules for naming of species. A scientific investigation is conducted in a particular subject with subsequent written presentation. Here, the candidates should show professional expertise and ability to critically evaluate scientific work.

Master candidate shall upon complete education:

#### **Knowledge**

- Have advanced knowledge and understanding of theories related to the fields of biodiversity and systematics and specialized knowledge in a defined area.
- Extensive knowledge of current research and practice in methodology of biodiversity and systematics.

#### **Skills**

- Be able to describe the evolutionary mechanisms that lead to speciation.
- Be able to explain species concept and be able to produce and critically analyze molecular data.
- Be able to assess their own work critically and thereby contribute to knowledge in the field.

#### **General competence**

- Understand the importance of biodiversity in a global perspective and understanding of ethical and economic aspects related to the conservation of biological diversity.
- Show awareness of ethical issues in relation to research and management practices within the specialization.

Curriculum for the specializations (see table below):

- **Cell and Molecular Biology**

- **Physiology**
- **Ecology, Behaviour, Evolution and Biosystematics**

Semester	7,5 ECTS	7,5 ECTS	7,5 ECTS	7,5 ECTS
4. Spring	BI3091 Special Syllabus			
3. Autumn	Optional course	Optional course		
2. Spring	Experts in Teamwork	Optional course		
1. Autumn	Optional course	Optional course	Optional course	

- **Cell and Molecular Biology:**

The compulsory courses for the specializations are:

Experts in teamwork, spring

BI3016 Molecular and Cell Biology, autumn

*BI 3091 Special Syllabus* BI3091 Special syllabus exam (and similar special curriculum courses) can be held together with the final master exam or at an earlier stage in the master programme.

In addition we recommend the following courses

Autumn:

BI 3013 Experimental Cell- and Molecular Biology	7,5 ECTS
BI3019 System biology; Resources, Standards, Tools	7,5 ECTS
TBT4135 Biopolymers	7,5 ECTS
BI3071 Advanced Ecotoxicology	7,5 ECTS
BI3072 Environmental toxicology	7,5 ECTS
BI3075 Experimental toxicology	7,5 ECTS
BI2022 Plante growth and Development	7,5 ECTS

Spring:

BI3018 Patentation and Commercialization of Biotech and Medtech Invention,	7,5 ECTS
TBT4125 Food Chemistry	7,5 ECTS
TBT4130 Environmental Biotechnology	7,5 ECTS
TBT4165 Systems Biology and Biological Networks	7,5 ECTS
BI3073 Genetic toxicology	7,5 ECTS

Courses from The Medical Faculty can also be chosen, but are not planned according to fit in the programme (timetable and examination date).

- **Physiology:**

The compulsory courses for the specializations are:

Experts in teamwork,

BI3021 Ecophysiology or BI3020 Advanced physiology

*BI 3091 Special Syllabus* BI3091 Special syllabus exam (and similar special curriculum courses) can be held together with the final master exam or at an earlier stage in the master programme.

In addition we recommend the following courses

BI2022 Plant growth and Development	7,5 ECTS
BI2021 Plant Eco Physiology	7,5 ECTS

BI2014 Molecular Biology	7,5 ECTS
BI2012 Cell Biology	7,5 ECTS
BI2015 Molecular Biology, lab.course	7,5 ECTS
BI3016 Molecular Cell Biology	7,5 ECTS
BI3019 Systems Biology: Resources, standards and tools,	7,5 ECTS
BI3020 Advanced physiology	7,5 ECTS
BI3071 Eco Toxicology	7,5 ECTS
BI3072 Environmental Toxicology	7,5 ECTS
BI3073 Genetic Toxicology	7,5 ECTS

Courses from The Medical Faculty can also be chosen, but are not planned according to fit in the programme (timetable and examination date).

• **Ecology, Behaviour, Evolution and Biosystematics;**

The compulsory courses for the specializations are:

Experts in teamwork,

BI3081 Scientific Seminars,

*BI 3091 Special Syllabus*; BI3091 Special syllabus exam (and similar special curriculum courses) can be held together with the final master exam or at an earlier stage in the master programme.

At least two of the courses (*In addition we recommend the courses*):

BI3084 Conservation Biology,

BI3010 Population Genetics,

BI3036 Plant Ecology,

BI3037 Freshwater Ecology,

BI3040 Behavioural Ecology,

BI3051 Evolutionary Analysis,

BI3082 Biodiversity and Conservation Biology II,

BI3083 Evolutionary and Ecological Genetics,

Curriculum for the specialization (see table below):

• **Biodiversity and Systematics (Nabis)**

	5 ECTS	5 ECTS	5 ECTS	5 ECTS	5 ECTS	5 ECTS
4. Spring	Master thesis					
3. Autumn	Master thesis					
2. Spring	Optional courses					
1. Autumn	Alpha taxonomical principles (UiO, compulsory)	Fundamental and molecular systematics (Uppsala U, compulsory)		Optional courses		

**Nabis** is a Nordic education cooperation where students take all their courses in master Nabis program and students are therefore exempted from the 'Experts in team'. Participation in Nabis will involve exchange and obligations at the various institutions. Participation in Nabis will give students at this program access to a course portfolio in biosystematics with advanced courses in floristics and faunistics, topics in taxonomic classification for different

groups of organisms, theoretical systematics, evolutionary biology and phylogeography, bioinformatics and molecular biology. Nabis program currently offers 24 courses that are categorized as follows:

- biodiversity identification (9 courses each 5 ECTS)
- biodiversity classification (6 courses each 10 ECTS)
- systematic theory (3 courses each 10 ECTS)
- tools and skills (6 courses each 5 ECTS)

Students are required to take at least one course in each of the categories above. For course overview, see <http://www.nabismaster.org/courses.php>. The courses are given at NTNU, University of Oslo, University of Tromsø, Gothenburg University, Stockholm University, Lund University, Uppsala University, Aarhus University and University of Copenhagen. Theory courses are mainly e-learning organized, but may include meetings with practical elements or intensive laboratory part which require attendance at the course location. An example is the compulsory course 'Fundamental and Molecular Systematics' which starts with two weeks of intensive laboratory component at a biological station in the beginning of the first semester. Attendance at the course location also applies to field-courses.

### **Admission requirements:**

The same entry requirements apply as for other graduate degrees: the Bachelor of Science in Biology (180 ECTS) or equivalent. The various specializations will have slightly different requirements for subjects completed in biology bachelor's degree.

### **Career prospects**

Graduates in Biology are employed in research, private industry, government and education in Norway and internationally. NTNU is together with University of Oslo and Bergen educating most of the master students in biology in Norway. A survey recently conducted by the Department of Biology, NTNU e shows that 40% of master's graduates from this biology Department get jobs before the end of the study. Three months after finished the master's exam, over 65% have gained relevant work. The market for graduates is likely to increase because of environmental challenges.

## **A) Information about the Master's Study**

### **Workload and Structure**

The programme requires two years of full-time study, beginning with the autumn term (medio August). The normal work load for a full-time student for one academic year is 60 ECTS credits.

The Master's study consists of two parts:

3. A written thesis of the project (Master's thesis). The extent of the assignment should correspond to a work load of 60 credits. The work on the thesis is time limited. The thesis has to be handed in within May 15th of the 2nd year.
4. An approved selection of courses, of a minimum of total of 60 credits, from what (at least) 30 credits must be courses at 3000-level (master level) (UTF§14.1).

## Master's agreement

Every master student has to make a Master's agreement. This agreement comprises your syllabus and master project together with regulations for the counseling given during the master's study. The subjects, compulsory or elective, stated as syllabus in your Masters Agreement cannot be changed. If there for serious reason develops a need for change, the Masters Agreement must be revised. The supervisor, the responsible institute and the student must agree upon the revision and the new Agreement filed.

## The Master's thesis

The Master thesis should be developed as your own original work (with some support from your adviser). Any quotation, use of data, information etc. from other sources (including the scientifically literature and your fellow students) should therefore be carefully listed and included in the reference list of your thesis, according to best practice within your field of study.

## Submission and Examination

The student has to:

- Register for the final master's degree exam (through STUDWEB) within February the 15<sup>th</sup> of the 2<sup>nd</sup> academic year
- Apply for approval of your [individual special syllabus](#) if your Masters Agreement demands a special syllabus. It is important that this is done well in advance of the examination. A study committee will evaluate the syllabus, and if it is not accepted, you must change it. Your supervisor must approve and sign the form. The syllabus should be a minimum of 50 pages per credit.
- Hand in the thesis (within the deadline given, see below) for print through [DAIM](#) .The Department will give you 5 copies of the thesis.

In addition to the judgment of thesis, the candidate will have an oral exam consisting of:

- A conversation on/presentation ("defense") of the research assignment (the master's thesis)

Examination on the theoretic syllabus of the advanced subjects which has previously not been evaluated during the study (at least 7,5 credits, preferentially individual special syllabus). All exams, except the Individual Special Syllabus (if any) have to be passed before the date of the final Master's Degree exam, unless otherwise stated in your Masters Agreement.

A grade is given for every course / special syllabus that constitutes a part of the exam.

## Important deadlines

- **15th of October (1<sup>st</sup> year):** Decide on a Master's project in cooperation with A supervisor.
- **1st of November (1<sup>st</sup> year)** Register your Master's Agreement in DAIM and hand in the project description.
- **15<sup>th</sup> of February (2<sup>nd</sup> year):**Deadline for the signing up of the final Master's Degree exam (through STUDWEB)
- **15<sup>th</sup> of May (2<sup>nd</sup> year).** Deadline for the submission of the master thesis. If the thesis is not submitted within this date the grade "not passed" will be awarded, unless there is an application for extension of the deadline in reasonable time before the deadline. The reasons given in the application must be in accordance with Supplementary Regulations for the Natural Sciences (UTF) § 20.3 and the Examination Regulations at NTNU, § 20. The Supplementary Regulations for the Natural Sciences (UTF) § 7 and the Examination Regulations at NTNU, § 7. See below for further information regarding §7 and §23.3.

- **15<sup>th</sup> of June** (approximately, **2<sup>nd</sup> year**): The date for the final Master's Degree exam. (Individual agreement with the respective Department, approximately four weeks after the thesis is submitted).

**Leave of absence from the Master Study (UTF § 7) (extract):**

- c) Leave of absence from the master studies of two years of duration and from the two last year of master studies of five years of duration is normally not granted.
- d) Leaves of absence may nevertheless be granted when applied for and compelling circumstances are present. Such circumstances might be illness (yourself or among close family member) etc.

**Prolongation of the study (UTF § 20.3) (extract):**

The master's thesis is time limited. In case of illness, the deadline for handing in the thesis can be postponed equivalent to the time of absence due to illness. The illness must be documented by medical certificate.

If there is a valid reason for not handing in the thesis in time, one can apply for up to three months prolongation of the deadline. If the thesis is not handed in within the extended deadline, a new extension must be applied for, or else the candidate is regarded failed. Delay of deadline can only be applied for twice.

Valid reasons for postponement (in addition to illness) is teaching, organized student activity, social work and unmerited problems concerning the thesis. Written documentation or statement is required, in addition to a new plan of completion. The Faculty, or Department when given the assignment by the Faculty, determines the application. When the reason for delay is teaching, organized student activity or social work, the extended time given is according to the time spent on these activities.

The agreed delay has no influence on the evaluation of the thesis.

**B) Programme Specific Regulations**

**Department of Biology:**

“BI3091 Special syllabus exam (and similar special curriculum courses) can be held together with the final master exam or at an earlier stage in the master programme.”



## MASTER OF SCIENCE IN MARINE COASTAL DEVELOPMENT

This Master of Science degree program in Marine Coastal Development is an integrated, two year study program for Norwegian and foreign students. The program is designed according to the current framework for engineering and science graduate studies at NTNU. The normal workload for a full-time student for one academic year is 60 credits.

The program is especially designed to give the students a broad understanding of the complex interactions in the coastal zone and how human activity affects this environment.

### Admission

Entry requirement to this MSc program is a Bachelor degree (or equivalent) in Science or Engineering with an academic profile in marine science. Norwegian students can enter the full M.Sc. programme, or select individual courses from the program in their study curriculum. Foreign students can be admitted through the Quota Program, with participants from developing countries and from Central and Eastern Europe. Students with other sources of financing may also be admitted to the full MSc program. Foreign exchange students can select individual courses from the program, provided they have the necessary qualifications for the courses.

### Learning objective

Objective of the Master's program in MSc in Marine Coastal Development

MSc in Marine Coastal Development provides students with knowledge, analytical skills and general knowledge at an advanced level, with the aim of working in universities, independent institutes, industry, consultancy, manufacturing, equipment, school sector and public administration, or for the purpose of further education in a doctoral degree program.

The Master of Science degree program provides an interdisciplinary, broad understanding of complex interactions in the marine environment. The oceans have large marine living and non-living resources that are becoming increasingly important, and that we will be more dependent of in the future. In order to utilize and conserve resources and develop coastal resources in a sustainable manner, there is a need for in-depth knowledge, interdisciplinarity, in both economy, environment, technology, marine biological resources, and other social developments.

The thesis provides special expertise in the areas of research: 1. Aquaculture, 2. Marine Harvesting 3. Marine Biology and Biochemistry

### Knowledge

The candidate has

- Solid knowledge of marine technology, marine biology or aquaculture and advanced knowledge in a variety of topics, some of which support the thesis
- Depth knowledge in the form of research experience in their field, through a supervised master's project
- Knowledge of the breadth of research conducted in the marine sciences today
- Interdisciplinary, broad understanding of complex interactions in the marine environment.
- Knowledge of different working and analytical methods used in the field.

### Skills

The candidate

- has background and experience to formulate and analyze complex bioscience research or technological problems
- Manages a variety of advanced theoretical and experimental methods in their fields.

- Can make critical and independent assessments of methods and results
- Can design, implement and report a scientific project both through teamwork and independent in the thesis
- Can communicate technical material and the results both to specialists and to a wider audience
- Can combine insights from several disciplines

#### General competence

##### The candidate

- Knows how the marine sector and its operations have evolved as a discipline / science, also internationally.
- Is able to acquire, evaluate and use relevant and reliable new information, and thus renew and further develop their professional skills
- Has knowledge of the marine sector's role in society and is the basis for assessing the ethical issues
- Has expertise in handling chemical substances and biological materials and understand environmental problems, focusing on health, safety and environment (HSE)

#### Specializations

The following three lines of specializations are offered: The students have to choose one of them. Deadline 15<sup>th</sup> October 1<sup>st</sup> semester.

#### □□□ **Aquaculture**

*Marine Juvenile Technology* –60 credits thesis possible

Contact: Professor Elin Kjørsvik

*Marine Aquaculture system* - Both 30 and 60 credits thesis possible

Contact: Professor Yngvar Olsen – 60 credits thesis  
Professor Harald Ellingsen – 30 credits thesis

*Recycling Aquaculture and Environmental Analysis* -30 credits thesis possible

Contact: Professor Tor Ove Leiknes

#### □□□ **Marine Harvesting**

*Processing of Marine Resources* - Both 30 and 60 credits thesis possible

Contact: Professor Turid Rustad – Both 30 and 60 credits thesis

*Sustainable Marine Harvesting* - 30 credits thesis possible

Contact: Professor Harald Ellingsen

#### □□□ **Marine Biology and Biochemistry**

*Marine Biology and Ecology* - 60 credits thesis possible

Contact: Professor Yngvar Olsen

*Marine Biochemistry and Biotechnology* - Both 30 and 60 credits thesis possible

Contact: Professor Kjell Morten Vaarum – Both 30 and 60 credits thesis

#### Contacts:

Professor Elin Kjørsvik, Department of Biology  
Elin.Kjorsvik@bio.ntnu.no

Professor Yngvar Olsen, Department of Biology  
Yngvar.Olsen@bio.ntnu.no

Professor Tor Ove Leiknes, Department of of Hydraulic and Environmental Engineering  
torove.Leiknes@ntnu.no

Professor Harald Ellingsen, Department of Marine Technology  
Harald.Ellingsen@ntnu.no

Professor Turid Rustad, Department of Biotechnology  
Turid.Rustad@biotech.ntnu.no

Professor Kjell Morten Vaarum, Department of Biotechnology  
Kjell.Morten.Vaarum@biotech.ntnu.no

### Compulsory courses

All students have two compulsory courses in common; TMR 4137 *Sustainable Utilization of Marine Resource*, and BI3061 *Biological Oceanography* in addition to “*Experts in Teamwork*”(see below). Every specialization has strongly recommended courses, see tables below.

### Experts in Teamwork

Experts in Teamwork is compulsory.

### Thesis

The thesis consists of 60 credits or 30 credits. This depends of the student's education and the chosen field of study. For instance, all students taking their thesis at the Department of Biology choose the 60 credits thesis. These students will start their work on the thesis in the 2.nd semester. Students with a former technology education taking their thesis at Department of Marine Technology or Department of Hydraulic and Environmental Engineering choose the 30 credit thesis, starting in their 4.th semester. Students at Department of Biotechnology may choose either a 30 or a 60 credits thesis.

## **A) Information about the Master's Study (Thesis 60 credits)**

### **Workload and Structure**

The programme requires two years of full-time study, beginning with the autumn term (medio August). The normal work load for a full-time student for one academic year is 60 ECTS credits.

The Master's study consists of two parts:

5. A written thesis of the project (Master's thesis). The extent of the assignment should correspond to a work load of 60 credits. The work on the thesis is time limited. The thesis has to be handed in within May 15th of the 2nd year.
6. An approved selection of courses, of a minimum of total of 60 credits, from what (at least) 30 credits must be courses at 3000-level (master level) (UTF\$14.1).

### **Master's agreement**

Every master student has to make a Master's agreement. This agreement comprises your syllabus and master project together with regulations for the counseling given during the master's study. The subjects, compulsory or elective, stated as syllabus in your Masters Agreement cannot be changed. If there for serious reason develops a need for change, the Masters Agreement must be revised. The supervisor, the responsible institute and the student must agree upon the revision and the new Agreement filed.

### **The Master's thesis**

The Master thesis should be developed as your own original work (with some support from your adviser). Any quotation, use of data, information etc. from other sources (including the

scientifically literature and your fellow students) should therefore be carefully listed and included in the reference list of your thesis, according to best practice within your field of study.

## Submission and Examination

The student has to:

- Register for the final master's degree exam (through STUDWEB) within February the 15<sup>th</sup> of the 2<sup>nd</sup> academic year
- Apply for approval of your [individual special syllabus](#) if your Masters Agreement demands a special syllabus. It is important that this is done well in advance of the examination. A study committee will evaluate the syllabus, and if it is not accepted, you must change it. Your supervisor must approve and sign the form. The syllabus should be a minimum of 50 pages per credit.
- Hand in the thesis (within the deadline given, see below) for print through [DAIM](#). The Department will give you 5 copies of the thesis.

In addition to the judgment of thesis, the candidate will have an oral exam consisting of:

- A conversation on/presentation (“defense”) of the research assignment (the master's thesis)

Examination on the theoretic syllabus of the advanced subjects which has previously not been evaluated during the study (at least 7,5 credits, preferentially individual special syllabus). All exams, except the Individual Special Syllabus (if any) have to be passed before the date of the final Master’s Degree exam, unless otherwise stated in your Masters Agreement.

•

A grade is given for every course / special syllabus that constitutes a part of the exam.

## Important deadlines

- **15th of October (1<sup>st</sup> year):** Decide on a Master's project in cooperation with a supervisor.
- **1st of November (1<sup>st</sup> year)** Register your Master's Agreement in DAIM and hand in the project description.
- **15<sup>th</sup> of February (2<sup>nd</sup> year):**Deadline for the signing up of the final Master’s Degree exam (through STUDWEB)
- **15<sup>th</sup> of May (2<sup>nd</sup> year).** Deadline for the submission of the master thesis. If the thesis is not submitted within this date the grade “not passed” will be awarded, unless there is an application for extension of the deadline in reasonable time before the deadline. The reasons given in the application must be in accordance with Supplementary Regulations for the Natural Sciences (UTF) § 20.3 and the Examination Regulations at NTNU, § 20. The Supplementary Regulations for the Natural Sciences (UTF) § 7 and the Examination Regulations at NTNU, § 7. See below for further information regarding §7 and §23.3.
- **15<sup>th</sup> of June (approximately, 2<sup>nd</sup> year):** The date for the final Master’s Degree exam. (Individual agreement with the respective Department, approximately four weeks after the thesis is submitted).

## Leave of absence from the Master Study (UTF § 7) (extract):

- e) Leave of absence from the master studies of two years of duration and from the two last year of master studies of five years of duration is normally not granted.

- f) Leaves of absence may nevertheless be granted when applied for and compelling circumstances are present. Such circumstances might be illness (yourself or among close family member) etc.

**Prolongation of the study (UTF § 20.3) (extract):**

The master's thesis is time limited. In case of illness, the deadline for handing in the thesis can be postponed equivalent to the time of absence due to illness. The illness must be documented by medical certificate.

If there is a valid reason for not handing in the thesis in time, one can apply for up to three months prolongation of the deadline. If the thesis is not handed in within the extended deadline, a new extension must be applied for, or else the candidate is regarded failed. Delay of deadline can only be applied for twice.

Valid reasons for postponement (in addition to illness) is teaching, organized student activity, social work and unmerited problems concerning the thesis. Written documentation or statement is required, in addition to a new plan of completion. The Faculty, or Department when given the assignment by the Faculty, determines the application. When the reason for delay is teaching, organized student activity or social work, the extended time given is according to the time spent on these activities.

The agreed delay has no influence on the evaluation of the thesis.

## **B) Programme Specific Regulations**

### **Department of Biology**

“BI3091 Special syllabus exam (and similar special curriculum courses) can be held together with the final master exam or at an earlier stage in the master programme.”

[More information](#)

[www.ntnu.no/macodev](http://www.ntnu.no/macodev)

**MSc in Marine Coastal Development (MACODEV)**  
**1st and 2nd year Specialization 60 credits**

Ex	Subject no	Subject title	Note	Cr	Specialization		
					1	2	3
1st sem autumn		<b>Compulsory courses</b>					
	TMR4137	SUST UTIL OF MARINE RESOURCES		7,5	C	C	C
	BI3061	BIOL OCEANOGRAPHY		7,5	C	C	C
	BI3062	SCIENTIFIC SEMINARS, MARINE		0	C	C	C
		<b>Optional courses A-list</b>	a				
	BI3064	FEED ORGANISMS IN MARINE FRY PROD	1,d	7,5	O	O	O
	BI3060	EXPERIMENTAL MARINE ECOL METHODS	1,3,d	7,5	O	O	O
	BI3063	BIOLOGICAL AND GENETIC STOCK MANAGE	2,3	7,5	O	O	O
	TBT4135	BIOPOLYMERS	3	7,5	O	O	O
	TBT4145	MOLECULAR GENETICS	3	7,5	O	O	O
	TMR4115	DESIGN METHODS	1,2	7,5	O	O	O
	TMR4130	RISK ANALYSES AND SAFETY MANAGEMENT	1,2	7,5	O	O	O
	TMR4135	FISHING VESSEL AND WORK BOAT DESIGN	2	7,5	O	O	O
		<b>Optional courses B-list</b>	b				
	BI3010	POPULATION GENETICS		7,5	O	O	O
	TBT4140	BIOCHEMICAL ENGINEERING		7,5	O	O	O
	TBT4175	AQUATIC FOOD PROCESSING AND TECHNOLOGY	1,2,3	7,5	O	O	O
	TIØ4120	OPERATION RESEARCH, INTRO		7,5		O	
	TMR4215	SEA LOADS	2	7,5	O	O	O
	TMR4295	DESIGN OF MECHANICAL SYSTEMS	2	7,5	O	O	O
	TTT4175	MARINE ACOUSTICS		7,5	O	O	O
TVM4145	UNIT PROC IN WATER AND WASTEWAT TREATM		7,5	O	O	O	
TEP4275	INDUSTRIAL ECOLOGY		7,5	O	O	O	
BT2110	AQFOOD SUPPLY CHAIN	1,2,3	7,5	O	O	O	
BT2115	AQFOODSAFETY	1,2,3	7,5	O	O	O	
2nd sem spring		<b>Compulsory courses</b>					
	-	EXPERTS IN TEAMWORK		7,5	C	C	C
	BI3062	SCIENTIFIC SEMINARS, MARINE		0	C	C	C
	BI3905/BT3905	MASTER THESIS IN MaCoDev		15	C	C	C
		<b>Optional courses A-list</b>	a				
	BI3065	EARLY LIFE HISTORY OF FISH	1,d,e	7,5	O	O	O
	BI3083	EVOLUTIONARY AND ECOLOGICAL GENETICS	1,2,3	7,5	O	O	O
	TEP4265	THERMAL AND PROCESS ENGINE FOR BIOMAT	2	7,5	O	O	
	TMR4140	DESIGN OF MARINE PRODUCTIONS PLANTS	1	7,5	O	O	O
	TMR4120	UNDERWATER ENGINEERING, BC	2	7,5	O	O	
	TMR4230	OCEANOGRAHY	2	7,5	O	O	O
	TMR4225	MARINE OPERATIONS		7,5	O		O
		<b>Optional courses B-list</b>	b				
BI3084	CONSERVATION BIOLOGY	3	7,5			O	
SØK2004	INDUSTRIAL ECONOMICS		7,5		O		
TBT4125	FOOD CHEMISTRY	2,3	7,5	O	O	O	
TMR4240	MARINE CONTROL SYSTEMS		7,5		O		
TTK4170	MOD AND IDENTIFIC BIOLOGICAL SYST	1	7,5	O			
3rd sem autumn		<b>Compulsory courses</b>					
	BI3062	SCIENTIFIC SEMINARS, MARINE		7,5	C	C	C
	BI3905/BT3905	MASTER THESIS IN MaCoDev		22,5	C	C	C
4th sem spring		<b>Compulsory courses</b>					
	BI3091	SPECIAL SYLLABUS FOR MASTER DEGREE		7,5	C	C	C
	BT3092	SPECIAL SYLLABUS FOR MASTER DEGREE		7,5	C	C	C
	BI3905/BT3905	MASTER THESIS IN MaCoDev		22,5	C	C	C

Specialization 60 credits:

1. Aquaculture
2. Marine Harvesting
3. Marine Biology and Biotechnology

**1) Aquaculture:**

The following courses are recommended in specialization

*Marine Juvenile Technology*

Autumn: BI3064, BI3060, TMR4115 Spring: BI3065, TMR4140

*Marine Aquaculture Systems*

Autumn: BI3064, TMR4115 Spring: BI3065, TMR4140, TTK4170

**2) Marine Harvesting**

The following courses are recommended in specialization

*Processing of Marine Resources*

Autumn: BI3063, TMR4115, TMR4130, TMR4135, TMR4215, TMR4295 Spring: TBT4125, TEP4265, TMR4120, TMR4230

**3) Marine Biology and Biotechnology:**

The following courses are recommended in specialization

*Marine Biology and Ecology*

Autumn: BI3060, BI3063, TBT4135, TBT4145 Spring: BI3084, TBT4125

*Marine Biochemistry and Biotechnology*

Autumn: BI3060, BI3063, TBT4135, TBT4145, Spring: TBT4125, TEP4265

d) This course is taught intensively

e) This course is taught every second year, 2013, -15, -17

**a) A-list**

Courses are considered when planning the teaching and examination schedule

**b) B-list**

Courses are NOT considered when planning the teaching and examination schedule

Other courses can be chosen

**C=Compulsory**

**O= Optional**

**MSc in Marine Coastal Development (MACODEV)**  
**1st and 2nd year Specialization 30 credits**

Ex	Subject no	Subject title	Note	Cr	Specialization			
					1	2	3	
1st sem autumn		<b>Compulsory courses</b>						
	TMR4137	SUST UTIL OF MARINE RESOURCES		7,5	C	C	C	
	BI3061	BIOL OCEANOGRAPHY		7,5	C	C	C	
		<b>Optional courses A-list</b>	a					
	BI3064	FEED ORGANISMS IN MARINE FRY PRODUCTIONS	1,d	7,5	O	O	O	
	TBT4135	BIOPOLYMERS	3	7,5	O	O	O	
	TBT4145	MOLECULAR GENETICS	3	7,5	O	O	O	
	TMR4115	DESIGN METHODS	1,2	7,5	O	O	O	
	TMR4130	RISK ANALYSES AND SAFETY MANAGEMENT	1,2	7,5	O	O	O	
	TMR4135	FISHING VESSEL AND WORK BOAT DESIGN	2	7,5	O	O	O	
		<b>Optional courses B-list</b>	b					
	BI3060	EXPERIMENTAL MARINE BIOLOGICAL METHODS	3,d	7,5	O	O	O	
	BI3063	BIOLOGICAL AND GENETIC STOCK MANAGEMENT	2,3	7,5	O	O	O	
	TBT4175	AQUATIC FOOD PROCESSING AND TECHNOLOGY	1,2,3	7,5	O	O	O	
	TBT4140	BIOCHEMICAL ENGINEERING		7,5	O	O	O	
	KJ3050	MARINE ORGANIC ENVIRONMENTAL CHEMISTRY	3	7,5			O	
	KJ3072	ADVANCED AQUATIC CHEMISTRY	3	7,5			O	
	TIØ4120	OPERATION RESEARCH, INTRO		7,5		O		
	TMR4215	SEA LOADS	2	7,5	O	O	O	
	TMR4295	DESIGN OF MECHANICAL SYSTEMS	2	7,5	O	O	O	
	BT2110	AQFOOD SUPPLY CHAIN	1,2,3	7,5	O	O	O	
	BT2115	AQFOODSAFETY	1,2,3	7,5	O	O	O	
	TTT4175	MARINE ACOUSTICS		7,5	O	O	O	
	TVM4145	UNIT PROC IN WATER AND WASTEWAT TREATM		7,5	O	O	O	
	TEP4275	INDUSTRIAL ECOLOGY		7,5	O	O	O	
	2nd sem spring		<b>Compulsory courses</b>					
			EXPERTS IN TEAMWORK		7,5	C	C	C
		<b>Optional courses A-list</b>	a					
BI3005		FISH BEHAVIOR AND ECOLOGY	1,2,3,d	7,5			O	
TBT4125		FOOD CHEMISTRY	2,3	7,5	O	O		
TEP4265		THERMAL AND PROCESS ENGINEERING FOR BIOMATER.	2	7,5	O	O		
TMR4120		UNDERWATER ENGINEERING, BC	2	7,5	O	O		
TMR4140		DESIGN OF MARINE PRODUCTIONS PLANTS	1	7,5	O	O	O	
TMR4230		OCEANOGRAPHY	2	7,5	O	O	O	
TMR4225		MARINE OPERATIONS		7,5	O		O	
		<b>Optional courses B-list</b>	b					
BI3065		EARLY LIFE HISTORY OF FISH	1,d,e	7,5	O	O	O	
BI3084		CONSERVATION BIOLOGY	3	7,5			O	
BI3073		GENETICS TOXICOLOGY	1,d	7,5	O		O	
SØK2004		INDUSTRIAL ECONOMICS		7,5		O		
TMR4240	MARINE CONTROL SYSTEMS		7,5		O			



Ex	Subject no	Subject title	Note	Cr	1	2	3
3rd sem		<b>Compulsory courses</b>					
autumn		<b>Specialization courses</b>					
	TBT4505	BIOTECHNOLOGY, SPEC COURSE	3	7,5	C	C	C
	TMR4575	FISHERIES AND MARINE RESOURCES, SPEC COURSE	2	7,5	C	C	C
		<b>Specialization projects</b>					
	TBT4505	BIOTECHNOLOGY, SPEC PROJ	3	7,5	C	C	C
	TMR4570	FISHERIES AND MARINE RESOURCES, SPEC PROJ	2	7,5	C	C	C
		<b>Optional courses</b>					
	BI3064	FEED ORGANISMS IN MARINE FRY PRODUCTIONS	1	7,5	O	O	O
	BI3060	EXPERIMENTAL MARINE ECOL METHODS	2	7,5	O	O	O
	BI3063	BIOLOGICAL AND GENETICAL STOCK MANAGEMENT	3	7,5	O	O	O
	BI3071	ADV ECOTOXICOLOGY	1	7,5	O		
	TBA4265	ARCTIC AND MARINE CIVIL ENGINEERING		7,5		O	
	TBT4135	BIOPOLYMERS	2	7,5	O	O	O
	TBT4140	BIOCHEMICAL ENGINEERING	1	7,5	O	O	
	TBT4145	MOLECULAR GENETICS		7,5	O	O	O
	TBT4175	AQUATIC FOOD PROCESSING AND TECHNOLOGY	1,2,3	7,5	O	O	O
	BT2110	AQFOOD SUPPLY CHAIN	1,2,3	7,5	O	O	O
	BT2115	AQFOODSAFETY	1,2,3	7,5	O	O	O
	TMR4115	DESIGN METHODS		7,5	O	O	
	TMR4135	FISHING VESSEL AND WORK BOAT DESIGN	2	7,5	O	O	O
	TMR4190	FINITE ELEMENT METHODS IN STRUCTURAL ANALYSES	2	7,5	O	O	O
	TMR4215	SEA LOADS		7,5	O	O	O
	TTT4175	MARINE ACOUSTICS		7,5	O	O	
	TEP4275	INDUSTRIAL ECOLOGY		7,5	O	O	
	TVM4145	UNIT PROC IN WATER AND WASTEWAT TREATM		7,5	O	O	
4th sem		<b>Compulsory courses</b>					
spring	BT3910	BIOTECHNOLOGY, MASTER THESIS		30	C	C	C
	TMR4905	MARINE SYSTEMS, MASTER THESIS		30	C	C	C

1. Aquaculture

2. Marine Harvesting

3. Marine biology and Biotechnology

### 1) Aquaculture:

The following courses are recommended in specialization:

*Marine Aquaculture Systems*

Autumn: BI3064, TMR4115, TMR4130 Spring: BI3065, TMR4140, TTK4170

*Recycling Aquaculture and Environmental Analysis*

Autumn: BI3064, BI3071, TBT4130, TMR4115, TMR4130 Spring: BI3065, BI3073, TBT4140, TMR4140, TTK4170

### 2) Marine Harvesting

The following courses are recommended in specialization:

*Processing of Marine Resources*

Autumn: BI3060, BI3063, TEP4265, TMR4115, TMR4135, Spring: BI3005, TBT4125, TBT4135, TMR4215

*Sustainable Marine Harvesting*

Autumn: TEP4265, TMR4115, TMR4130, TMR4135 Spring: TBT4125, TMR4190, TMR4215, TMR4120, TMR4230, TMR4295

**3) Marine Biology and Biotechnology:**

The following courses are recommended in specialization:

*Marine Biochemistry and Biotechnology*

Autumn: BI3060, BI3063, TBT4135, TBT4145 Spring: TBT4125, TTT4195

- d) This course is taught intensively
- e) This course is taught every second year, 2013, -15, -17
- a) **A-list** Courses are considered when planning the teaching and examination schedule
- b) **B-list** Courses are NOT considered when planning the teaching and examination schedule

Other courses can be chosen

**C=Compulsory**

**O= Optional**

## MASTER OF SCIENCE IN AQUATIC FOOD PRODUCTION – SAFETY AND QUALITY

Programme code: MSAQFOOD

AQFood is an international master education open to all and offering mobility between the Nordic Countries. The programme is offered by a consortium of five leading universities in the Nordic countries. The universities are working together to deliver a key education for the aquatic food sector. The five universities are:

- Norwegian University of Science and Technology (NTNU), Department of Biotechnology, Trondheim, Norway.
- Technical University of Denmark (DTU), National Food Institute, Kgs Lyngby, Denmark.
- Norwegian University of Life Science (UMB), Department of Mathematical Sciences and Technology, Ås, Norway.
- Swedish University of Agricultural Sciences (SLU), Department of Wildlife, Fish and Environmental Studies, Umeå, Sweden.
- University of Iceland (HI), School of Engineering & Natural Science, Reykjavik, Iceland.

with three specialised study lines:

Aquatic Production, Natural Resources and Industrial Production.

### Learning Objectives

*The focus in this programme is to address the entire value chain and to consider important aspects of economy, production management as well as environmental challenges making it a unique education on master level. Students will obtain the necessary background and knowledge of the operation of the entire aquatic food production chain as well as safety and quality issues. The understanding of the role of the various academic fields that contribute to the efficiency and transparency of the aquatic food supply chain will be enhanced and field studies will ensure the necessary industrial focus. The AQFood master's programme has three study tracks: Aquatic Production, Natural Resources, and Industrial Production. The master's programme includes a 30 ECTS core (4 courses taken during the 1<sup>st</sup> semester). The core courses are given as web based learning.*

### Knowledge

The MSc graduate in AQFood has:

- Substantial knowledge of the entire aquatic value chain – including global trends in terms of resources and environmental impact, basic concepts of food quality and food safety, production systems (aquaculture and fisheries), methods for processing and packaging of aquatic food products and systems for transport/logistics of aquatic products and the role of supply chain management and information technologies to enhance transparency and ensure quality, safety and traceability of products, challenges in innovation and marketing for the aquatic fish/food sector.
- In- depth knowledge in a specific area based upon research experience from a master's project
- In-depth knowledge within the chosen field of specialization

## Proficiency/skills

The MSc graduate in AQFood:

- Is able to carry out a scientific work process from theoretical background to hypothesis generation, data collection and interpretation of results
- Is able to use his or her knowledge to solve challenges in the aquatic food value chain
- Is able to evaluate methods and results within the field of specialization critically

## General competence

The MSc graduate in AQFood:

- Is able to communicate research results in English, both written and orally, to professionals and to a wider audience
- Is able to acquire and evaluate research information
- Is able to work on a project alone and in cooperation with others in interdisciplinary groups
- Is able to contribute to innovative thinking within the specialization in particular
- Has got competence within health, environment and safety (HSE) in general ,and within HSE within the specialization in particular
- Is familiar with research ethics

## Information about the Master's Study

### Admission requirements

Admission to the MSc programme in Aquatic Food Production - Safety and Quality requires a BSc or BSc Eng degree corresponding to a minimum 180 ECTS credits in: Chemistry, Biology, Biotechnology, Food science, Food technology, Industrial Engineering, Life science, Environment or other comparable degree.

When you apply you have to decide which study track you want to follow, therefore you have to ensure that you fulfill the requirements for both universities in your study track. Applicants for NTNU must have basic knowledge in statistics, mathematics and biochemistry.

When applying for admission, you must provide evidence of your academic achievements and proficiency in English. TOEFL or IELTS certificates must be original and sent directly to DTU from the test centre.

TOEFL: Paper-based: 580 (written section grade 4,5). Computer-based test: 237 (essay writing grade 4,5). Internet-based test: 92 (written section grade 22).

IELTS: 6.5, no section lower than 5.5 (only IELTS Academic Training accepted).

English language test exceptions:

- Applicants who have completed a university degree instructed in English at a university that is physically located in one of the following countries: USA, Canada, UK, Ireland, Australia, New Zealand.
- Applicants who have completed at least a 3-year degree instructed in English in an EU/EEA country.

- Applicants with upper secondary education and a Bachelor's degree (issued or ongoing if the applicant is currently enrolled in the last semester) from a Nordic country may be exempted from an additional English test. Please include the school leaving certificate of your upper secondary education into your application package.

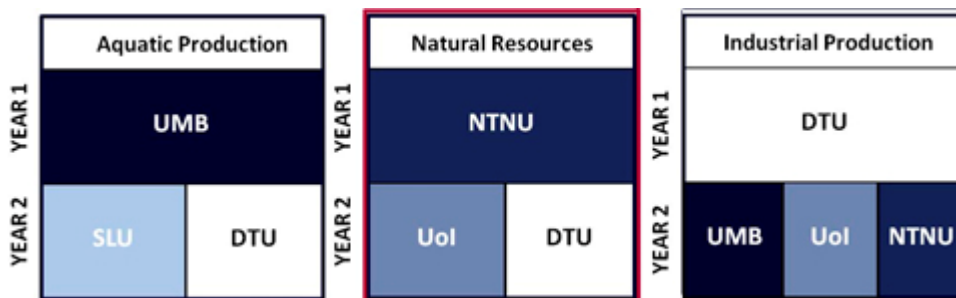
### Workload and structure

The Nordic Master Programme in "Aquatic Food production – Safety and Quality" AQFood is a 120 ECTS double degree obtained in two years. It is a requirement that you start at one University and finish at another University depending on your choice for the specialization. The programme requires two years of full-time study, beginning with the autumn term (medio August). The normal work load for a full-time student for one academic year is 60 ECTS credits.

The first two semesters are taking place either at UMB, NTNU, or DTU with three possible study tracks:

- Aquatic Production (UMB)
- Natural Resources (NTNU)
- Industrial Production (DTU)

The last two semesters take place at one of the 5 universities depending on the study track you have chosen.



Compulsory courses for all students in the first year:

Ssemester 1:

- 23UM Primary Production – Aquacultures and Fisheries(BT3115) (7,5 ECTS)
- 23NT Aquatic Food Processing and Technology (BT3110) (7,5 ECTS)
- 23DT Safety and Human Health Effects of Aquatic Food (BT2115) (7,5 ECTS)
- 23HI Aquatic Food Supply Chain Management, Environment and Resources (BT2110) (7,5 ECTS)

### Study track: Aquatic Production

If you choose this study track, you are admitted at UMB, and then take your last year either at SLU or at DTU. In the first year you will gain competences in Aquatic Production at UMB and in the second year you can decide to carry on your studies either at DTU or at SLU. At DTU you will gain additional competences in industrial production whilst at SLU you will gain additional competences in Fish and Wild Life Management.

The MSc graduate in AQFood, study track aquatic production:

- Is able to analyse and evaluate systems used in aquatic production and optimize the production of broodstock, juvenile and adult fish
- Is able to evaluate the cause and effect of different production techniques strategies and handling process during the life of the fish and final process of fish as food (DTU specialization)
- Is able to assess quality attributes by relevant sensory, microbiological, biochemical and chemical methods throughout the production (DTU specialization)
- Is able to classify on the basis of problem formulation, method accomplishment, personnel and equipment requirements, permits and animal welfare and ethical issues (SLU specialization)
- Is able to apply population ecology, especially with regard to sustainable use of harvested animal populations and the conservation of small populations (SLU specialization)

Compulsory courses in the first year:

Semester 2:

- TAT254 Basic Aquaculture Engineering (5 ECTS)
- TAT211 Aquaculture Production (10 ECTS)
- TAT250 Aquaculture Laboratory Course (5 ECTS)

Compulsory courses in the second year:

Semester 3:

**Specialization: UMB/SLU:** Aquatic Production and Fish Wild Life Management

- BI1123\* Fish and Wildlife Census Techniques (15 ECTS)
- BI1076\* Project based advanced course (15 ECTS)

*\*Not mandatory but recommended*

or

**Specialization: UMB/DTU** Aquatic Production and Industrial Production

- 23501 Biological Quality - Pre-harvest Impact on Post-harvest Product Quality (5 ECTS)
- 23DT Aquatic Food Microbiology – (5 ECTS)
- 23DT Food Quality - Preserving high quality throughout the production (5 ECTS)

Semester 4:

Master thesis

### **Study track: Natural Resources**

In the first year you will gain competences in Natural Resources at NTNU and in the second year you can decide to carry on your studies either at DTU or at HI (UoI). At DTU you will gain additional competences in Industrial Production whilst at HI (UoI) you will gain additional competences in Supply Chain Management.

The MSc in AQFood, study track natural resources:

- Is able to evaluate the economical, technical, environmental and biological challenges of the aquatic food value chain from a management and sustainability perspective
- Is able to estimate the impact of laws and regulations that can have effect on revenue or evaluate the cause and effect of different production techniques strategies and handling process during the life of the fish and final process quality of fish as food

Compulsory courses in the first year:

Semester 2:

- TMR4137 Sustainable Utilization of Marine Resources (7.5 ECTS)
- BI3061 Biological Oceanography (7.5 ECTS)

Compulsory courses in the second year:

Semester 3:

**Specialization: NTNU/(HI (UoI): Natural Resources and Supply Chain Management**

- IDN110F Production Planning (7.5 ECTS)
- IDN116F Supply Chain Management (7.5 ECTS)

or

**Specialization: NTNU/DTU: Natural Resources and Industrial Production**

- 23501 Biological Quality - Pre-harvest Impact on Post-harvest Product Quality (5 ECTS)
- 23DT Aquatic Food Microbiology – (5 ECTS)
- 23DT Food Quality - Preserving high quality throughout the production (5 ECTS)

Semester 4:

Master Thesis

**Study track: Industrial Production**

In the first year you will gain competences in Industrial Production at DTU and in the second year you can decide to carry on your studies either at NTNU, UMB or HI (UoI). At NTNU you will gain additional competences in Food Biochemistry, at UMB in Product Development whilst at HI (UoI) you will gain additional competences in Supply Chain Management.

The MSc in AQFood, study track Industrial Production:

- Is able to evaluate environmental effects of specific aquatic food processing operations and have knowledge of aquatic food quality and shelf-life together with the ability to evaluate quality attributes by relevant sensory, microbiological, biochemical and chemical methods.

- Is able to document aquatic food processing, quality, safety and health effects taking into account national and EU-regulations
- Is able to estimate how ICT can influence supply chain management in aquatic food chains for optimizations of processes and evaluate how supply chain management can improve the quality of safety related recalls (UoI specialization)

Compulsory courses in the first year:

Semester 2:

- 23102 Food Safety in Production Chains (10 ECTS)
- 23520 Food Process Design (10 ECTS)

Mandatory courses for the second year:

Semester 3:

**Specialization: DTU/UMB:** Industrial Production and Product development

- MVI 385 Food Product Development (10 ECTS)
- INN410 Intellectual Property Rights and Innovation (5 ECTS)

or

**Specialization: DTU/(HI (UoI):** Industrial Production and Supply Chain Management

- IDN110F Production Planning (7.5 ECTS)
- IDN116F Supply Chain Management (7.5 ECTS)

or

**Specialization : DTU/NTNU:** Industrial Production and Food Biochemistry

- BT 8119 Food Chemistry Advanced (7.5 ECTS)
- BT 8112 Salting of Fish (7.5 ECTS)

Semester 4:

Master Thesis

### **The Master thesis**

The Master thesis should be developed as your own original work (with some support from your adviser). Any quotation, use of data, information etc from other sources (including the scientifically literature and your fellow students) should therefore be carefully listed and included in the reference list of your thesis, according to best practice within your field of study.

### **Programme Specific Regulations**

The students should follow the rules and regulations at the university at which they reside at any given moment.



### **Master's agreement**

Students who are admitted at NTNU have to make a Master's agreement. This agreement comprises your syllabus and master project together with regulations for the counseling given during the master's study. The subjects, compulsory or elective, stated as syllabus in your Master's agreement cannot be changed. If there for serious reasons develops a need for change, the Master's agreement must be revised. The supervisor, the responsible Department and the student must agree upon the revision and the new agreement filed.

### **Important deadlines at NTNU**

- 15<sup>th</sup> of February (2<sup>nd</sup> year): Deadline for registration for the final Master's Degree exam (through STUDWEB)
- 15<sup>th</sup> of May (2<sup>nd</sup> year): Deadline for the submitting the master thesis. If the thesis is not submitted within this date the grade "not passed" will be awarded, unless there is handed in an application for extension of the deadline in reasonable time before the deadline. The reasons given in the application must be in accordance with Supplementary Regulations for the Natural Sciences (UTF) § 20.3 and the Examination Regulations at NTNU, § 20. Alternatively such an application may be dealt with, taken into consideration The Supplementary Regulations for the Natural Sciences (UTF) § 7 and the Examination Regulations at NTNU, § 7 . See below for further information regarding §7 and §23.3.
- 15<sup>th</sup> of June (approximately, 2<sup>nd</sup> year): is the date for the final Master's Degree exam. (Individual agreement with the respective Department, approximately four weeks after the thesis is submitted).

### **Leave of absence from the Master Study (UTF § 7) (extract):**

- a) Leave of absence from the master studies of two years of duration and from the two last year of master studies of five years of duration is normally not granted.
- b) Leaves of absence may nevertheless be granted when applied for and compelling circumstances are present. Such circumstances might be illness (yourself or among close family member) etc.

### **Prolongation of the study (UTF § 20.3) (extract):**

The master thesis is time limited. In case of illness, the deadline for handing in the thesis can be postponed equivalent to the time of absence due to illness. The illness must be documented by medical certificate.

If there is a valid reason for not handing in the thesis in time, one can apply for up to three months prolongation of the deadline. If the thesis is not handed in within the extended deadline, a new extension must be applied for, or else the candidate is regarded failed. Delay of deadline can only be applied for twice.

Valid reasons for postponement (in addition to illness) is teaching, organized student activity, social work and unmerited problems concerning the thesis. Written documentation or statement is required, in addition to a new plan of completion. The Faculty, or Department when given the assignment by the Faculty, determines the application. When the reason for delay is teaching, organized student activity or social work, the extended time given is according to the time spent on these activities.

The agreed delay has no influence on the evaluation of the thesis.

## MASTER OF SCIENCE IN NATURAL RESOURCES MANAGEMENT

Sustainable use of natural resources such as water, fossil energy, minerals and biological resources in land and water ecosystems are essential for the survival and development of mankind. However, the increasing needs and demands for these natural resources resulting from the growth of the human population combined with the decrease of the finite resources urgently calls for a sustainable management and conservation of these resources. Such management requires an interdisciplinary approach including in-depth knowledge about specific resources as well as a holistic perspective, including ecological, economic, social and cultural aspects, which are all central in an ecosystem services framework. Consequently there is increasing demand in society for scientists with interdisciplinary competence within natural resources management. The master programme aims to enable students to combine interdisciplinary knowledge to solve problems related to environmental issues and the management of natural resources.

The Master of Science in Natural Resources Management is an interdisciplinary cooperative programme involving three faculties at NTNU, and the programme is administrated by the Faculty of Natural Sciences and Technology.

The programme offers 4 specialisations:

- Biology
- Chemistry
- Resource Geology
- Geography

### ***Learning outcomes***

The interdisciplinary master programme in Natural Resources Management provides students with advanced knowledge, analytical skills and general knowledge at an advanced level aiming for work within the fields of research, public administration, governmental and non-governmental organizations, education and industry.

The Masters in Natural Resources Management offers specializations in the 4 disciplines: Biology, Chemistry, Resource Geology and Geography. The master's programme includes 30 ECTS elective courses that allow students to be interdisciplinary and flexible in the individual composition of their academic profile.

The program will provide a thorough insight into processes and mechanisms related to conflicting interests over the use of natural resources. In the master's thesis the student will obtain an advanced in-depth understanding in a topic that is relevant within the field of management of natural resources.

### **Knowledge**

The MSc graduate in Natural Resources Management has:

- Substantial multidisciplinary knowledge about natural resources management related

- to the research within the specialization
- Substantial knowledge in a specific area based upon research experience from a masters project
- Substantial knowledge about various methodological and analytic approaches that are used within the specialization.

### **Proficiency/Skills**

The MSc graduate in Natural Resources Management:

- Can independently carry out a complete scientific work process, including the theoretical background, hypotheses generation, collecting and analyzing data as along with the interpretation of results and their presentation
- Has high competence and multidisciplinary project experience within selected topics related to natural resources management and ability to contribute in a multidisciplinary team towards the management and sustainable use of natural resources

Can critically evaluate methods and results within the field of specialisation.

### **General Competence**

The MSc graduate in Natural Resources Management:

- Can communicate research results in English, both in written and oral to both professionals and to a wider audience
- Can acquire and evaluate research information
- Can work on a project independently and in cooperation with others in interdisciplinary groups
- Can contribute to innovative thinking within the specialization in particular
- Has competence within Health- Environment and Safety in general, and within Health- Environment and Safety within the specialization in particular
- Is familiar with research ethics.

### **Specialisation: Biology**

With a specialization within biology the student holds an in-depth competence within the fields of conservation biology, ecology, evolution, systematics and/or physiology. The student with specialization within biology will through the work on the master project obtain an in-depth knowledge *in a biologically based research topic* which is related to the management of the biological resource in question.

The MSc graduate in Natural Resources Management with biology specialization will hold the following knowledge and skills:

### **Knowledge**

The MSc graduate in Natural Resources Management has:

- A broad knowledge within the respective biological field (theoretical and experimental) and how this integrates with management of natural resources for sustainable use
- Knowledge about biological diversity, ecosystem services and other aspects of conservation biology and how this knowledge can be applied to find environmentally sound solutions
- A thorough understanding of evolutionary and ecological processes.

### **Proficiency/Skills**

The MSc graduate in Natural Resources Management:

- Can apply the biological knowledge as well as the knowledge about management of natural resources within research, public administration, governmental and nongovernmental organizations
- Can evaluate and apply relevant theory, methods and analytic approaches within the respective field of biology, including statistical methods
- Can implement knowledge from several research fields and disciplines.

### **Specialisation: Geography**

A specialization within geography provides the student with in-depth competence within selected geographical concepts and theories, and skills for applying this competence to natural resource management issues. The students also attain an in-depth competence in relevant geographical research methods and understand their relevance for research on natural resource management issue. The student specializing in geography will through the master project acquire in-depth knowledge within a research topic directly or indirectly related to the natural resource management issue in question.

The MSc graduate in Natural Resources Management specializing in geography will hold the following knowledge and skills:

### **Knowledge**

The MSc graduate in Natural Resources Management has:

- Acquired a deep understanding of general concepts and theories from the field of geography, and integrated this with an understanding of concepts and theories from the specific field of natural resource management
- Knowledge about research fields in geography such as environmental geography, political ecology, natural resource management or other relevant specialisations in geography, and understand how this knowledge can be applied on environmental issues.

### **Proficiency/Skills**

The MSc graduate in Natural Resources Management:

- Can evaluate and apply relevant theory, methods and analytic approaches within the field of geography on natural resource management issues
- Can implement knowledge from several research fields and disciplines
- Can apply geographical knowledge as well as knowledge about management of natural resources in public administration, governmental and non-governmental organisations.

### **Specialisation: Chemistry**

With a specialization within chemistry the student holds a broad competence within the fields of environmental chemistry and analytical chemistry. The student specializing in chemistry will through the master project acquire in-depth knowledge within a research topic related to the natural resource management issue in question. The MSc graduate in Natural

Resources Management with chemistry specialization will hold the following knowledge and skills:

### **Knowledge**

The MSc graduate in Natural Resources Management has:

- Broad knowledge of environmental and analytical chemistry required to monitor, understand, explain and predict consequences of natural changes and man-made influences on earth, air, water, and the living environments
- Broad knowledge of how environmental chemistry integrates with management and sustainable use of natural resources
- Basic knowledge of chemical speciation and the importance of speciation in dispersion of chemical environmental pollution and monitoring

### **Proficiency/Skills**

The MSc graduate in Natural Resources Management:

- Can apply the knowledge in environmental and analytical chemistry as well as knowledge about management of natural resources within research, public administration, governmental and nongovernmental organizations
- Can evaluate and apply relevant theory, methods and analytic approaches within environmental and analytical chemistry, including relevant statistical methods.
- Can integrate knowledge from several research fields and disciplines.

*There will no longer be admission to the specialisation Chemistry after the Spring term 2013*

## **Specialisation: Resource Geology**

### **Knowledge**

The MSc graduate in Natural Resources Management has:

- A solid theoretical knowledge of mineral and ore-deposit forming processes
- Specialized knowledge on a specific type of geological deposits.
- specialized knowledge of several analytical methods relevant to in depth studies of geological deposits
- General knowledge of mining techniques and environmental as well as socio-cultural implications of economic exploitation of geological deposits

### **Proficiency/skills**

The MSc graduate in Natural Resources Management

- Are able to partake in studies of geological deposits in collaboration with relevant experts
- Know where to find and how to retrieve and interpret relevant geological background information
- Know how to design and initiate sampling of geological data relevant for a given deposit type

## **Admission Requirements**

### **General requirements**

Norwegian/Nordic and international applicants should hold a BSc degree or equivalent university education either in Biology, Chemistry, Resource Geology or Geography. Applicants holding another related Bachelor degree may also be considered. There will be an individual evaluation of applicants.

Applicants who are not exempted from the English language requirement, must document that they have passed a recognized test in English; TOEFL or IELTS.

<http://www.ntnu.edu/studies/langcourses>

### **BSc Biology – study plan:**

Applicants who would like to apply for specialisation in Biology need to have a Bachelor degree including basic courses in biology, minimum 80 ECTS. As example of requirements, check the plan of study in BSc degree in Biology at NTNU <http://www.ntnu.edu/studies/bbi> The bachelor degree must in addition include courses in resources management, planning and interdisciplinary project management equivalent of minimum one quarter of a year full time study. Priority will be given to applicants with background in introductory university level in Mathematics and Statistics. When applying write a statement of purpose or a motivation essay of about 200 words describing your main academic interest for this programme and this specialisation.

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### **BSc Resource Geology – study plan:**

Applicants who would like to apply for specialisation in Resource Geology need to have a Bachelor degree in Bedrock-and Resource Geology or equivalent. As example of requirements, check the plan of study in BSc degree in Bedrock- and Resource Geology at NTNU <http://www.ntnu.edu/studies/bgeol/bedrock> The bachelor degree must in addition include courses in resources management, planning and interdisciplinary project management equivalent of minimum one quarter of a year full time study. Applicants are recommended to have background in introductory university level in Mathematics and Statistics. When applying write a statement of purpose or a motivation essay of about 200 words describing your main academic interest for this programme and this specialisation.

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### **Bachelor degree in Geography – study plan:**

Applicants who would like to apply for specialization in Geography should hold a Bachelor degree including at least 1,5 year of studies within geography or natural resources management. Other relevant qualifications can be accepted upon approval by the Department of Geography. The bachelor degree must in addition include courses in resources management, planning and interdisciplinary project management equivalent of minimum one quarter of a year full time study. When applying write a statement of purpose or a motivation essay of about 200 words describing your main academic interest for this programme and this specialisation.

## ***Programme Structure and specialisations***

### **About the study programme:**

The MSc programme in Natural Resources Management is a 2 years of full-time study integrating both Norwegian/Nordic and international students. The study programme comprises a total of 120 ECTS credits. The normal workload for a full-time student during one academic year is 60 ECTS credits. The study is structured around 4 compulsory core courses, elective courses and a Master's thesis (60 ECTS credits).

The Master's thesis is to be planned and started already in the first semester and has to be completed in semester 4. The thesis work will as far as possible be integrated in ongoing research projects at their respective department according to the field of study. The content of the thesis should fulfill an academic level appropriate to master level course. An individual supervisor will be assigned in semester 1, who will be responsible for supervising the Master's thesis.

One of the compulsory core course is a scientific seminar, RFEL3080 Scientific Seminars, which is running through all the 4 semesters. There are also a number of elective courses, which gives options to fit background and interests for the student throughout the studies.

**Field work:** After the first year of studies, during the period of mid-June to mid-August, candidates may be given the opportunity to go back to their home countries to do field work if this is necessary for the completion of their thesis. Students who are supported by the Quota Programme are awarded an extra grant to cover field-trip expenses, while other students will have to finance the field-trip themselves. In some cases there could be specially project allowances.

### Structure of the International Masterstudy in Natural Resources Management

Year	Semester					Total credits
2	4. semester Spring	Special Syllabus for Master Degree* (7,5 credits)				30
	3. semester Autumn	Master Thesis (60 credits)				30
1	2. semester Spring	Elective course (7.5 credits)	Elective course (7.5 credits)	Elective course (7.5 credits)		30
	1. semester Autumn	Elective course (7.5 credits)	RFEL 3081 Natural Resources Management, Interdisciplinary Project (7.5 credits)	GEOG 3030 Natural Resources Management (7.5 credits)		30
						120

Mandatory courses (30 credits)
Elective courses (30 credits)
Master thesis (60 credits)

\* Course code for Special Syllabus for Master's Degree for each of the specialisations in the programme:

Biology: BI3091

Chemistry: KJ3091

Resource Geology: GEOL3093

Geography: GEOG3091

The Special syllabus exam (and similar special curriculum courses) can be held together with the final master exam or at an earlier stage in the master programme. This concerns all the specialisations at the programme, (BI3091, KJ3091, GEOL3093, GEOG3091)

\*\* Course code for Master's Thesis for each of the specialisations in the programme:

Biology: NATRBI3900

Chemistry: NATRKJ3900

Resource Geology: GEOL3090

Geography: GEOG3940



## Elective Course list 2013-2014

KJ3053 Analytical methods for Industrial and Environmental Monitoring (7,5 credits) Autumn  
 KJ3072 Advanced Aquatic Chemistry (7,5 credits), Autumn  
 KJ 3071 Applied geochemistry (7,5 credits) Autumn  
 KJ3050 Marine Organic Environmental Chemistry (7,5 credits), Autumn, (restricted admission)  
 KJ3059 Advanced Chromatography (7,5 credits), Autumn  
 BI2017 Genetics and Evolution I (7,5 credits) Spring \*  
 BI2033 Population Ecology (7,5credits) Spring\*  
 BI2034 Community Ecology (7,5credits) Autumn \*  
 BI2043 Biodiversity and Conservation Biology I (7,5 credits)Autumn\*  
 BI2044 Ethology (7,5 credits) Spring  
 BI2045 Communication and Reproduction Behaviour (7,5 credits) Spring  
 BI3010 Population Genetics (7,5 credits) Autumn  
 BI3036 Plant ecology (7,5 credits) Spring  
 BI3037 Freshwater ecology (7,5 credits), Autumn  
 BI3051 Evolutionary Analyses (7,5 credits) Spring  
 BI3072 Environmental Toxicology (7,5 credits) Autumn  
 BI3082 Biodiversity and Conservation Biology II (7,5 credits) Autumn  
 BI3083 Evolutionary and Ecological Genetics (7,5 credits) Spring  
 BI3040 Behavioural Ecology (7,5 credits) Spring  
 BI3041 Sexual Selection (7,5 credits) Spring  
**\*BI2017, BI2033, BI2034 and BI2043 are mandatory in BSc Biology, NTNU and these students cannot choose these elective courses.**  
 TGB4115 Mineral Deposit Geology (7,5 credits) Autumn  
 TGB4120 Prospecting and Formation of Selected Ore-Deposits (7,5 credits) Spring  
 TGB4135 Basin Analysis(7,5 credits) Spring  
 TGB4170 Diagenesis/Reservoir Quality(7,5 credits) Spring  
 TPG4177 Carbonate Reservoir Characterization(7,5 credits) Autumn  
 GEOG3003 Methodology and the Research Process(7,5 credits) Autumn  
 GEOG3005 Qualitative Methods (7,5 credits) Spring  
 GEOG3006 Quantitative Methods (7,5 credits) Spring  
 GEOG3505 Landscape and Planning (15 credits) Autumn  
 GEOG3515 Environment, Development and Changing Rural Livelihoods (7,5 credits) Autumn  
 GEOG3523 GIS data capture and mapping, (7,5 credits), Spring  
 SØK3524 Environmental and Resource Economics (15 credits) Autumn and Spring  
 POL3517 International development: The Effects of Politics, Institutions and International Economy (15 credits) Spring  
 FI5207 Multicultural Conflicts and Ethics (7,5 credits) Spring  
 FI5205 Corporate Responsibility and Ethics (7,5 credits) Autumn  
 KULT3320 Globalization Theory (7,5 credits) Autumn  
 HIST3295 International Economic Contemporary History (7,5 credits) Autumn

The list of the following courses can be elected by all students attending the international master programme MSc Natural Resources Management if you have the knowledge demanded in the course description. It is also possible to choose other courses apart from this list according to specific interest and in agreement with the supervisor and responsible Department.

### ***Examples of Master's thesis in Natural Resources Management***

- Wildlife-livestock Land Use Conflict, a case study in Bale Mountains National Park, Ethiopia
- Biodiversity Conservation and Resource Utilization: Conflict between Wildlife Management and Local Stake holders and its Fate to Migratory birds. In southern great rift valley of Ethiopia, Abiyata Shala Lakes National Park
- Eco tourism and local sustainable development in Singapore? A Case study of: Pulau Ubin Island, Singapore
- Downstream Impact of Hydropower Dams on the Livelihood Changes of Local Inhabitants
- In what way does the personal background of a caseworker influence natural resource management decisions?
- Research on perceptions and attitudes of local communities towards forest management: A case study in Takoradi Forest District
- Elemental Composition of moose dietary plants
- Management of protected areas in Europa and Africa. Do the differences in management regime result in different conflict types and - levels?

### ***Special information about the Master's Study***

#### **Workload and Structure**

The programme requires two years of full-time study, beginning with the autumn term (medio August). The normal work load for a full-time student for one academic year is 60 ECTS credits.

The Master's study consists of two parts:

1. A written thesis of the project (Master's thesis). The extent of the assignment should correspond to a work load of 60 credits. The work on the thesis is time limited. The thesis have to be submitted within May 15<sup>th</sup> of the 2<sup>nd</sup> year, while the students at the specialisation Geography have to submit the thesis May 10<sup>th</sup> of the 2<sup>nd</sup> year.
2. An approved selection of courses, of a minimum of total of 60 credits, from what (at least) 30 credits must be courses at 3000-level (master level) (UTF§14.1).

#### **Master's agreement**

Every master student has to sign a Master's Agreement. This agreement comprises your syllabus and master project together with regulations for the counselling given during the Master's study. The courses, compulsory or elective, stated as syllabus in your Master's Agreement cannot be changed. If there for serious reason develops a need for change, the Master's Agreement must be revised. The supervisor, the responsible institute and the student must agree upon the revision and the new Agreement filed.

#### **The Master's thesis**

The Master's thesis should be developed as your own original work (with some support from your adviser). Any quotation, use of data, information etc from other sources (including the

scientifically literature and your fellow students) should therefore be carefully listed and included in the reference list of your thesis, according to the best practice within your field of study. *There is no tolerance for plagiarism which will result in not achieving the degree.*

## Submission and Examination

The student has to:

- Register for the final Master's Degree examination (through STUDWEB) within February the 15<sup>th</sup> of the 2<sup>nd</sup> academic year
- Apply for approval of your [individual special syllabus](#) if your Master's Agreement demands a special syllabus. It is important that this is done well in advance of the examination. A study committee will evaluate the syllabus, and if it is not accepted, you must change it. Your supervisor must approve and sign the form. The syllabus should be a minimum of 50 pages per credit.
- Submitting the thesis (within the deadline given, (see below) for printing through [DAIM](#) *except for the geography students*, who need to contact the Department of Geography or check this link <http://www.ntnu.edu/geography/master-thesis> The Department will give you 5 copies of the thesis. In addition to the evaluation of the thesis, the candidate will have an oral examination consisting of:
- A conversation on/presentation ("defence") of the research assignment (the Master's thesis)
- Examination on the theoretic syllabus of the advanced courses which has previously not been evaluated during the study (at least 7,5 credits, preferentially individual special syllabus). All examinations, except the Individual Special Syllabus (if any) have to be passed before the date of the final Master's Degree examination, unless otherwise stated in your Master's Agreement.
- A grade is given for every course / special syllabus that constitutes a part of the final Master's Degree examination.

## Important deadlines

- **15<sup>th</sup> of October (1<sup>st</sup> year):** Decide on a Master's project in cooperation with the supervisor. Geography students have to check with the Geography Department for their process.
- **1<sup>st</sup> of November (1<sup>st</sup> year)** Register your Master's Agreement in DAIM and hand in the project description. Geography students have to follow the routine at the Department of Geography to hand in the project description.
- **15<sup>th</sup> of February (2<sup>nd</sup> year):**Deadline for the signing up of the final Master's Degree exam (through STUDWEB)
- **10<sup>th</sup> of May (2<sup>nd</sup> year).** Deadline for the submission of the Master' thesis for the geography students
- **15<sup>th</sup> of May (2<sup>nd</sup> year).** Deadline for the submission of the Master' thesis for biology and chemistry students
- Resource geology students have to contact the Department of Geology and Mineral Resources Engineering for individual agreement for delivering.
- If the thesis is not submitted within this date the grade "not passed" will be awarded, unless there is handed in an application for extension of the deadline in reasonable time before the deadline. The reasons given in the application must be in accordance with Supplementary Regulations for the Natural Sciences (UTF) § 20.3 and the Examination Regulations at NTNU, § 20. Alternatively such an application may be dealt with, taken into consideration The Supplementary Regulations for the Natural Sciences (UTF) § 7 and the Examination Regulations at NTNU, § 7 . See below for further information regarding §7 and §23.3.

**15<sup>th</sup> of June (approximately, 2<sup>nd</sup> year):** is the date for the final Master's Degree exam. There will be individual agreement with the respective Department, approximately four weeks after the thesis is submitted.

**Leave of absence from the Master's Study (UTF § 7) (extract):**

- a) Leave of absence from the master studies of two years of duration and from the two last year of master studies of five years of duration is normally not granted.
- b) Leaves of absence may nevertheless be granted when applied for and compelling circumstances are present. Such circumstances might be illness (yourself or among close family member) etc.

**Prolongation of the study (UTF § 20.3) (extract):**

Time for the Master's study is limited. In case of illness, the deadline for submitting the thesis can be postponed equivalent to the time of absence due to illness. The illness must be documented by medical certificate.

If there is a valid reason for not submitting the thesis in time, one can apply for up to three months prolongation of the deadline. If the thesis is not submitted within the extended deadline, a new extension must be applied for, or else the candidate is regarded failed. The delay of deadline can only be applied for twice.

Valid reasons for postponement (in addition to illness) is teaching, organized student activity, social work and unmerited problems concerning the thesis. Written documentation or statement is required, in addition to a new plan of completion. The Faculty of Natural Sciences and Technology (NT-Faculty), or the Department when given the assignment by the NT-Faculty, determines the application. When the reason for delay is teaching, organized student activity or social work, the extended time given is according to the time spent on these activities.

The agreed delay has no influence on the evaluation of the thesis.

## MASTER OF SCIENCE IN ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY

Programme code: MSENVITOX

Anthropogenic pollution is one of the most significant threats to the environment. Organic and inorganic environmental toxicants originating from human activities are distributed throughout the world via oceanic currents and atmospheric transport processes. This issue is of global importance. Consequently there is a high demand from both society and industry for scientists with competence within the interdisciplinary scientific area of environmental toxicology and chemistry.

### Learning outcomes

The master programme in Environmental Toxicology and Chemistry provides students with knowledge, analytical skills and general knowledge at an advanced level, with the aim of working in research, manufacturing, consulting, education and public administration, or for the purpose of further education in a doctoral program.

The master programme aims to enable students to combine biological and chemical knowledge to solve problems related to environmental pollution.

The master programme is interdisciplinary and will provide students with specialization in issues related to pollution in the natural environment with an either chemical or biological main approach, but with a solid basis in both chemistry and biology. The programme will provide a thorough insight into the processes and mechanisms related to how environmental toxicants are absorbed by organisms, dispersal mechanisms locally and globally, how they are distributed and transported in ecosystems, how they can be monitored, and the effects that environmental toxicants have on cells, organs, organisms, populations and ecosystems. Depending on the main approach, the programme will also provide insight and practical experience in methodology and analytical techniques of relevance for working with issues within environmental chemistry and environmental toxicology. The study also focuses on the dissemination of research results to a wide audience.

### Knowledge

After finishing the study programme, the candidate should have acquired

- wide academic and applied knowledge in biology and/or chemistry with specialization in the field of Environmental Toxicology and/or Environmental Chemistry.
- knowledge of chemical properties of different groups of compounds and biological effects and important cycles, as basis for a comprehensive understanding of climate/environment, pollution and toxicology.
- knowledge of the physicochemical and/or biophysical processes of importance to the natural environment.
- research experience in a speciality that requires advanced knowledge of biology and/or chemistry through a supervised master's project that extends over several semesters.
- knowledge of relevant methods and hypothesis testing, including experimental analysis (chemical and/or biological), statistical techniques and other tools used to analyze and solve biological and/or chemical issues in research, manufacturing, management and/or teaching.
- knowledge of international research in her/his speciality, knowledge of international research groups in the field, and the breadth of research being done in the fields of "Environmental Toxicology" and "Environmental Chemistry".

## **Skills**

After finishing the study programme, the candidate should

- have professional knowledge of and be able to utilize a variety of advanced quantitative and qualitative analysis methods, methodology in the field and the application of these to independently analyze and solve (modelling) toxicological and/or chemical problems.
- be able to collect and analyze environmental samples, perform statistical analysis of data and interpretation and presentation of research results.
- combine insights from several scientific disciplines.
- make critical and independent assessments of methods and results.
- continuously develop his/her professional competence.
- be able to communicate subject matter and scientific results both to specialists and to a wider audience and be able to formulate scientific reasoning/argumentation.
- have expertise in handling chemical substances and/or biological material and understand environmental issues, including EHS.

## **General competence**

After finishing the study programme, the candidate is should

- know important aspects in environmental pollution, understand this discipline's role in society and be able to assess ethical issues within this field.
- be able to acquire, evaluate and adopt relevant and reliable new information.
- have the background to carry out/solve advanced tasks and projects, both independently and in teams, and have the ability to assess her/his own efforts in projects.
- have an international perspective on her/his scientific field.

## **Career prospects**

Graduates of the Masters programme will be internationally qualified for a wide range of positions in public and government institutions, administrative environmental agencies, consultancy companies and industry (e.g. oil and energy companies and the chemical industry) both as researcher or adviser. Some examples are Statoil and other oil companies, Det Norske Veritas, SINTEF, and national environmental authorities. Furthermore, there is an increasing need for competence within the area of risk assessment (REACH).

Through this programme you will be part of a large international scientific and industrial network. The candidates in environmental toxicology can after five years of work experience apply to become a "European Registered Toxicologist".

## Admission requirements

One of the following requirements has to be fulfilled to qualify for admission to the programme:

- To qualify for the specialisation in Environmental Toxicology: BSc in Biology (minimum of 80 ECTS credits biology courses) including pollution biology. In addition, applicants must have basic knowledge in chemistry.
- To qualify for the specialisation in Environmental Chemistry: BSc in Chemistry (minimum of 80 ECTS credits chemistry courses) including environmental and/or analytical chemistry. In addition, applicants must have basic knowledge in mathematics.
- Bachelor degrees within other related areas may be considered on an individual basis. The candidate's background should provide a biological and/or chemical relevant basis for the master study in Environmental Toxicology and Chemistry (e.g. courses listed below in the bachelor degrees at NTNU forming the basis for this master study).

In the following tables you will find the admission requirements for NTNU BSc students.

Compulsory courses are written in bold.

### BSc in Chemistry, Environmental and Analytical Chemistry:

Year	Semester				
3	6. Spring	KJ2022 Spectroscopic Methods in Organic Chemistry	TKJ4175 Chemometrics	<b>KJ2053</b> <b>Chromatography</b>	<b>TBI4110</b> <b>Ecotoxicology</b> <b>and</b> <b>Environmental</b> <b>Resources</b>
	5. Autumn	<b>KJ1041</b> <b>Chemical</b> <b>Bonds,</b> <b>Spectroscopy</b> <b>and Kinetics</b>	<b>KJ2031</b> <b>Inorganic</b> <b>Chemistry,</b> <b>Advanced Course</b>	BI1003 Evolutionary Biology, Ecology and Ethology	
2	4. Spring	<b>KJ1042</b> <b>Basic</b> <b>Thermodynamic</b> <b>s with</b> <b>Laboratory</b>	<b>KJ2072</b> <b>Environmental</b> <b>Chemistry</b>	<b>KJ2073</b> <b>Analytical</b> <b>Environmental</b> <b>Chemistry</b>	Elective course
	3. Autumn	<b>Perspective</b> <b>Course</b>	<b>KJ2050</b> <b>Analytical</b> <b>Chemistry, Basic</b> <b>Course</b>	ST0103 Statistics with Applications	TFY4120 Physics
1	2. Spring	<b>TMT4130</b> <b>Inorganic</b> <b>Chemistry</b>	<b>MA0002</b> <b>Mathematical</b> <b>Methods B</b>	<b>KJ1020</b> <b>Organic Chemistry</b>	
	1. Autumn	<b>EXPH0001</b> <b>Philosophy and</b> <b>Theory of</b> <b>Science</b>	<b>MA0001</b> <b>Mathematical</b> <b>Methods A</b>	<b>KJ1000</b> <b>General Chemistry</b>	
ECTS Credits:		7,5	7,5	7,5	7,5

**BSc in Biology, Cell and Molecular Biology:**

Year	Semester				
3	6 Spring	<b>BI2071 Pollution Biology I</b>		<b>ST2304 Statistical modelling for biologists/biotechnologists</b>	<b>KJ2072 Environmental Chemistry</b>
	5 Autumn	<b>BI2014 Molecular Biology</b>	<b>BI2015 Molecular Biology, Laboratory Course</b>	<b>Perspective Course</b>	KJ2050 Analytical Chemistry, Basic Course
2	4 Spring	<b>EXPH0001 Philosophy and Theory of Science</b>	<b>BI2012 Cell Biology</b>	<b>KJ1020 Organic Chemistry</b>	
	3 Autumn	<b>BI1004 Physiology</b>		<b>MA0001 Mathematical Methods A</b>	<b>ST0103 Statistics with Applications</b>
1	2 Spring	<b>BI1001 Cell and Molecular Biology</b>		<b>BI1002 Faunistics and Floristics in Norwegian Ecosystems</b>	
	1 Autumn	<b>BI1003 Evolutionary Biology, Ecology and Ethology</b>		<b>KJ1000 General Chemistry</b>	
ECTS Credits:		7,5	7,5	7,5	7,5

**BSc in Biology, Physiology:**

Year	Semester				
3	6 Spring	<b>BI2071 Pollution Biology I</b>		<b>ST2304 Statistical modelling for biologists/biotechnologists</b>	<b>KJ2072 Environmental Chemistry,</b>
	5 Autumn	<b>BI2020 Zoo-Physiology or BI2021 Plant Ecophysiology or BI2022 Plant Growth and Development</b>		<b>Perspective Course</b>	BI2014 Molecular Biology/KJ2050 Analytical Chemistry, Basic Course
2	4 Spring	<b>EXPH0001 Philosophy and Theory of Science</b>	<b>BI2012 Cell Biology</b>	<b>KJ1020 Organic Chemistry</b>	
	3 Autumn	<b>BI1004 Physiology</b>		<b>MA0001 Mathematical Methods A</b>	<b>ST0103 Statistics with Applications</b>
1	2 Spring	<b>BI1001 Cell and Molecular Biology</b>		<b>BI1002 Faunistics and Floristics in Norwegian Ecosystems</b>	
	1 Autumn	<b>BI1003 Evolutionary Biology, Ecology and Ethology</b>		<b>KJ1000 General Chemistry</b>	
ECTS Credits:		7,5	7,5	7,5	7,5



## Information about the Master's Study

### Workload and structure

The programme requires two years of full-time study, beginning with the autumn term (medio August). The normal work load for a full-time student for one academic year is 60 ECTS credits.

The Master's study consists of two parts:

1. A written thesis of the project (Master thesis). The extent of the assignment should correspond to a work load of 60 credits. The work on the thesis is time limited. The thesis has to be submitted within May 15<sup>th</sup> of the 2nd year.
2. An approved selection of courses, a minimum of total 60 credits, from what (at least) 30 credits must be courses at 3000-level (master level) (UTF§14.1).

### Master's agreement

Every master student has to make a Master's agreement. This agreement comprises your syllabus and master project together with regulations for the counseling given during the master's study. The subjects, compulsory or elective, stated as syllabus in your Master's agreement cannot be changed. If there for serious reason develops a need for change, the Master's agreement must be revised. The supervisor, the responsible Department and the student must agree upon the revision and the new agreement filed.

### The Master thesis

The Master thesis should be developed as your own original work (with some support from your adviser). Any quotation, use of data, information etc from other sources (including the scientifically literature and your fellow students) should therefore be carefully listed and included in the reference list of your thesis, according to best practice within your field of study.

### Submission and Examination

The student has to:

- Register for the final master's degree exam (through STUDWEB) within February the 15<sup>th</sup> of the 2<sup>nd</sup> academic year
- Apply for approval of your [individual special syllabus](#) (KJ3091 or KJ3093 for students in Environmental Chemistry/BI3091 or BI3093 for students in Environmental Toxicology). It is important that this is done well in advance of the examination. A study committee will evaluate the syllabus, and if it is not accepted, you must change it. Your supervisor must approve and sign the form. Hand in the thesis (within the deadline given, see below) for print through [DAIM](#). The Department will give you 5 copies of the thesis.

In addition to the judgment of thesis, the candidate will have an oral exam consisting of:

- A conversation on/presentation ("defence") of the research assignment (the master thesis)
- Examination on the special syllabus of the advanced courses which has previously not been evaluated during the study (at least 7,5 credits, preferentially individual special syllabus). All exams, except the special syllabus (if any) have to be passed

before the date of the final Master's Degree exam, unless otherwise stated in your Master's agreement.

A grade is given for every course/special syllabus that constitutes a part of the exam.

### **Important deadlines**

- **15<sup>th</sup> of October (1<sup>st</sup> year):** Decide on a Master's project in cooperation with the supervisor.
- **15<sup>th</sup> of October (1<sup>st</sup> year)** Register your Master's agreement in DAIM and hand in the signed agreement, a project description and risk assessment of the project.
- **15<sup>th</sup> of February (2<sup>nd</sup> year):** Deadline for registration for the final Master's Degree exam (through STUDWEB)
- **15<sup>th</sup> of May (2<sup>nd</sup> year).** Deadline for the submission of the master thesis. If the thesis is not submitted within this date the grade "not passed" will be awarded, unless there is handed in an application for extension of the deadline in reasonable time before the deadline. The reasons given in the application must be in accordance with Supplementary Regulations for the Natural Sciences (UTF) § 20.3 and the Examination Regulations at NTNU, § 20. Alternatively such an application may be dealt with, taken into consideration The Supplementary Regulations for the Natural Sciences (UTF) § 7 and the Examination Regulations at NTNU, § 7 . See below for further information regarding §7 and §23.3.
- **15<sup>th</sup> of June (approximately, 2<sup>nd</sup> year):** is the date for the final Master's Degree exam. (Individual agreement with the respective Department, approximately four weeks after the thesis is submitted).

### **Leave of absence from the Master Study (UTF § 7) (extract):**

- a) Leave of absence from the master studies of two years of duration and from the two last year of master studies of five years of duration is normally not granted.
- b) Leaves of absence may nevertheless be granted when applied for and compelling circumstances are present. Such circumstances might be illness (yourself or among close family member) etc.

### **Prolongation of the study (UTF § 20.3) (extract):**

The master thesis is time limited. In case of illness, the deadline for handing in the thesis can be postponed equivalent to the time of absence due to illness. The illness must be documented by medical certificate.

If there is a valid reason for not handing in the thesis in time, one can apply for up to three months prolongation of the deadline. If the thesis is not handed in within the extended deadline, a new extension must be applied for, or else the candidate is regarded failed. Delay of deadline can only be applied for twice.

Valid reasons for postponement (in addition to illness) is teaching, organized student activity, social work and unmerited problems concerning the thesis. Written documentation or statement is required, in addition to a new plan of completion. The Faculty, or Department when given the assignment by the Faculty, determines the application. When the reason for delay is teaching, organized student activity or social work, the extended time given is according to the time spent on these activities.

The agreed delay has no influence on the evaluation of the thesis.

## Programme Structure and Specialisations

A diverse team of scientists is ready to offer you a two year international, interdisciplinary Master's programme in close collaboration with SINTEF and Statoil. You will work in a group incorporating both Norwegian and international students. All teaching is in English. The programme also offers you the opportunity to experience one semester in the University Centre in Svalbard (UNIS). Svalbard is an island archipelago situated in the heart of the Arctic.

There are two areas of scientific specialisation in this Masters programme:

Environmental Chemistry  
Environmental Toxicology

Below you will find tables and lists of courses that describe the programme structure for each of these specialisations. The final structure of the course will be individually selected by each student allowing you to create the study programme most suited to your interests and skills. Advice will be given by the course administrators if required, and all study plans must be approved by the respective department.

You will find the course descriptions at the following web sites:

**NTNU courses:** <http://www.ntnu.no/studies/courses>

**UNIS courses:** [http://www.unis.no/10\\_STUDIES/1020\\_Courses/](http://www.unis.no/10_STUDIES/1020_Courses/)

## Environmental Chemistry:

### 1) For students spending all semesters at NTNU:

Year	Semester				
2	4 Spring NTNU:	<b>KJ3091 (7,5 ECTS) Special syllabus for Master's degree</b>	Master thesis		
	3 Autumn NTNU:	<b>KJ3053<sup>3)</sup> (7,5 (ETCS) Analytical methods for industrial- and environmental monitoring</b>	Master thesis		
1	2 Spring NTNU:	<b>Experts in Team Work (7,5 ECTS)</b>	Elective course (7,5 ECTS)	Master thesis	
	1 Autumn NTNU:	<b>KJ3050<sup>1)</sup> (7,5 ECTS) Organic Marine Environmental Chemistry</b>	KJ3072 (7,5 ECTS) Advanced Aquatic Chemistry	Elective course	<b>RFEL3070<sup>2)</sup> (7,5 ECTS) Scientific Seminars in Pollution</b>
ECTS Credits		7,5	7,5	7,5	7,5

<sup>1)</sup> KJ3050 requires previous knowledge in general chemistry corresponding to KJ1000 and a basic course in analytical chemistry (e.g. KJ2050).

<sup>2)</sup> The students have to follow the RFEL3070 course in all semesters at NTNU.

<sup>3)</sup> TKJ4175 Chemometrics is recommended previous knowledge for KJ3053.

*Compulsory courses (written in bold in the table):*

KJ3050<sup>1)</sup> Organic marine environmental chemistry (7,5) (Autumn)

REFEL3070 Scientific Seminars in Pollution (7,5) (All semesters)

Experts in team work (7,5) (Spring)

KJ3053 Analytical methods for industrial- and environmental monitoring (7,5) (Autumn)

KJ3091 Special syllabus for Master's degree (7,5) (Last semester)

*Elective courses:*

KJ2050<sup>1)</sup> Analytical Chemistry, Basic Course (7,5) (Autumn)

KJ3059 Advanced Chromatography (7,5) (Autumn)

KJ3072 Advanced Aquatic Chemistry (7,5) (Autumn)

BI3071 Advanced Ecotoxicology (7,5) (Autumn)

BI3072 Environmental Toxicology (7,5) (Autumn)

## 2) For students spending the second semester at UNIS:

Year	Semester				
2	4 Spring NTNU:	<b>KJ3091/KJ3093 (7,5/10 ECTS) Special syllabus for Master's degree</b>	Master thesis		
	3 Autumn NTNU:	Elective course/ Master thesis	Master thesis		
1	2 Spring UNIS:	<b>AT-324 (10 ECTS) Techniques for the Detection of Organo-Chemical Pollutants in the Arctic Environment<sup>3)</sup></b> and/or <b>AT-330 (10 ECTS) Arctic Environmental Toxicology<sup>3)</sup></b> and/or <b>AT-331 (10 ECTS) Arctic Environmental Pollution: Atmospheric Distribution and Processes<sup>3)</sup></b>		Elective course/ Master thesis	
	1 Autumn NTNU:	<b>KJ3050<sup>1)</sup> (7,5 ECTS) Organic Marine Environmental Chemistry</b>	KJ3072 (7,5 ECTS) Advanced Aquatic Chemistry	Elective course/ Master thesis	<b>RFEL3070<sup>2)</sup> (7,5 ECTS) Scientific Seminars in Pollution</b>
ECTS Credits		7,5	7,5	7,5	7,5

<sup>1)</sup> KJ3050 requires previous knowledge in general chemistry corresponding to KJ1000 and a basic course in analytical chemistry (e.g. KJ2050).

<sup>2)</sup> The students have to follow the RFEL3070 course in all semesters at NTNU.

<sup>3)</sup> Students spending the second semester at UNIS must take at least two of the three courses

offered (AT-324, AT-330 and AT-331) to get exempted from Experts in Team Work at NTNU. For students also doing corresponding field work at Svalbard, special agreements can be made according to the rules for exception from EiT. The requirements are:

*Compulsory courses (written in bold in the table):*

KJ3050<sup>1</sup> Organic marine environmental chemistry (7,5) (Autumn)

REFEL3070 Scientific Seminars in Pollution (7,5) (All semesters)

*Two of the three following courses offered at UNIS (total of 20 ECTS):*

AT-324 Techniques for detection of organo-chemical pollutants in the arctic environment (10) (Spring)

AT-330 Arctic Environmental Toxicology (10) (Spring)

AT-331 Arctic Environmental Pollution: Atmospheric Distribution and Processes (10) (Spring)

KJ3091 Special syllabus for Master's degree (7,5) (last semester)

or

KJ3093 Special syllabus for Master's degree (10) (last semester) only for those who follow 2 of the 3 courses at UNIS

KJ3091 Special syllabus exam (or KJ3093) can be held together with the final master exam or within two weeks of the master exam.

*Elective courses:*

KJ2050<sup>1</sup> Analytical Chemistry, Basic Course (7,5) (Autumn)

KJ3053 Analytical methods for industrial- and environmental monitoring (7,5) (Autumn) (TKJ4175 Chemometrics (7,5) (Spring) is recommended previous knowledge for KJ3053).

KJ3059 Advanced Chromatography (7,5) (Autumn)

KJ3072 Advanced Aquatic Chemistry (7,5) (Autumn)

BI3071 Advanced Ecotoxicology (7,5) (Autumn)

BI3072 Environmental Toxicology (7,5) (Autumn)

## Environmental toxicology:

### 1) For students spending all semesters at NTNU:

Year	Semester				
2	4 Spring NTNU:	<b>BI3091 (7,5 ECTS) Special syllabus for Master's degree</b>	Master thesis		
	3 Autumn NTNU:	<b>BI3075 (7,5 ECTS) Experimental Ecotoxicology</b>	Elective course (7,5 ECTS)	Master thesis	
	2 Spring NTNU:	<b>Experts in Team Work (7,5 ECTS)</b>	BI3073 (7,5 ECTS) Genetic Toxicology	Master thesis	
	1 Autumn NTNU:	<b>BI3071 (7,5 ECTS) Advanced Ecotoxicology</b>	<b>BI3072 (7,5 ECTS) Environmental Toxicology</b>	<b>RFEL3070<sup>1</sup> (7,5 ECTS) Scientific Seminars in Pollution</b>	Master thesis
ECTS Credits		7,5	7,5	7,5	7,5

<sup>1)</sup> The students have to follow the RFEL3070 course in all semesters at NTNU.

*Compulsory courses:*

RFEL3070 Scientific Seminars in Pollution (7,5) (All semesters)  
 BI3071 Advanced Ecotoxicology (7,5) (Autumn)  
 BI3072 Environmental Toxicology (7,5) (Autumn)  
 Experts in Team Work (7,5) (Spring)  
 BI3075 Experimental Ecotoxicology (7,5) (Autumn)  
 BI3091 Special syllabus for Master's degree (7,5) (last semester)

*Elective courses:*

BI3073 Genetic Toxicology (7,5) (Spring)  
 KJ2050 Analytical Chemistry, Basic Course (7,5) (Autumn)  
 KJ3050 Organic marine environmental chemistry (7,5) (Autumn)

*(KJ3050 requires previous knowledge in general chemistry corresponding to KJ1000 and a basic course in analytical chemistry (e.g. KJ2050))*

**2) For students spending the second semester at UNIS:**

Year	Semester				
2	4 Spring NTNU:	<b>BI3091/BI3093 (7,5/10 ECTS) Special syllabus for Master's degree</b>	Master thesis		
	3 Autumn NTNU:	<b>BI3075 (7,5 ECTS) Experimental Ecotoxicology</b>	Master thesis		
1	2 Spring UNIS:	<b>AT-324 (10 ECTS) Techniques for the Detection of Organo-Chemical Pollutants in the Arctic Environment<sup>2)</sup></b> and/or <b>AT-330 (10 ECTS) Arctic Environmental Toxicology<sup>2)</sup></b> and/or <b>AT-331 (10 ECTS) Arctic Environmental Pollution: Atmospheric Distribution and Processes<sup>2)</sup></b>		Master thesis	
	1 Autumn NTNU:	<b>BI3071 (7,5 ECTS) Advanced Ecotoxicology</b>	<b>BI3072 (7,5 ECTS) Environmental Toxicology</b>	<b>RFEL3070<sup>1)</sup> (7,5 ECTS) Scientific Seminars in Pollution</b>	Master thesis
ECTS Credits		7,5	7,5	7,5	7,5

<sup>1)</sup> The students have to follow the RFEL3070 course in all semesters at NTNU.

<sup>2)</sup> Students spending the second semester at UNIS must take at least two courses at UNIS (20 ECTS) to get exempted from Experts in team work at NTNU. For students also doing corresponding field work at Svalbard, special agreements can be made according to the rules for exception from EiT. The requirements are:

**Compulsory courses:**

RFEL3070 Scientific Seminars in Pollution (All semesters)

BI3071 Advanced Ecotoxicology (Autumn)

BI3072 Environmental Toxicology (Autumn)

BI3075 Experimental Ecotoxicology (Autumn)

*Two of these courses offered at UNIS (total of at least 20 ECTS):*

AB-203 Arctic Environmental Management (15) (Spring)

AB-323 Light, Climate and Primary Production in the Arctic (10) (Spring)

AT-324 Techniques for Detection of Organo-chemical Pollutants in the Arctic Environment (10) (Spring)

AT-330 Arctic Environmental Toxicology (10) (Spring)

AT-331 Arctic Environmental Pollution: Atmospheric Distribution and Processes (10) (Spring)

BI3091 Special syllabus for Master's degree (7,5)

or

BI3093 Special syllabus for Master's degree (10) only for those who follow 2 of the 3 courses at UNIS

BI3091 Special syllabus exam (and similar special curriculum courses) can be held together with the final master exam or at an earlier stage in the master programme.

**Examples of Master Theses**

- Developing and establishing analytical methods and tools for use in environmental monitoring of marine and coastal areas, including quality assurance of these methods.
- Impacts of oil and gas activities on the marine environment, including biomonitoring and studies of harmful effects on invertebrates and fish.
- Distribution of brominated flame retardants in nature, including their bioaccumulation and toxicological effects in different organisms.
- Long-range atmospheric transport, deposition and effects of trace metals (e.g. lead, mercury, cadmium) in air, snow, soil, water, and ecosystems. An example of this is the chemistry of mercury in the Arctic after polar sunrise.
- Occurrence of environmental pollutants in complex mixtures. To increase the understanding of their interaction, in vitro studies are carried out, in which cells are exposed to individual toxicants and mixtures of known environmental pollutants (e.g. PAHs, PCBs, trace metals)
- Fate and effects of crude oil in the marine environment following accidental and chronic releases. The behaviour of spilled oil in the environment and the use of analytical chemical methods for oil spill identification and monitoring.

**Contact information and counselling**

Address: NTNU, Faculty for Natural Sciences and Technology, 7491 Trondheim, Norway

Telephone: 73 59 41 97

E-mail: [studier-master@nt.ntnu.no](mailto:studier-master@nt.ntnu.no)

URL: <http://www.ntnu.no/nt/english>

<http://www.ntnu.edu/studies/msenvitox>

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## **MASTER OF SCIENCE IN PHYSICS**

Programme code: MSPHYS

### **Degree Programme**

In physics we try to reveal the secrets of nature, from the microcosm of elementary particles to the macrocosm of astrophysics. Between these two extremes there is a wealth of subjects, ranging from biophysics at cellular level and medical research to the development of new understanding in fields such as nanotechnology and climate. At present, these and many other areas are advancing in exciting ways.

### **Specializations**

In general, the specializations are:

- Astro and Particle Physics and Modern Field Theory
- Biophysics and Medical Physics
- Energy and Environmental Physics
- Optics and Condensed Matter Physics

Additional information about the specializations are found on the programme's webpages, <http://www.ntnu.edu/studies/msphys>

### **Admission Requirements**

For admission to the programme, you are required to hold a Bachelor's degree in physics, equivalent to 180 ECTS credits. Alternatively, you may be admitted with a Bachelor's degree not in physics, but with a sufficient formal background in calculus based physics (a minimum of 80 ECTS credits) and mathematics (a minimum of 30 ECTS credits).

### **Learning Objectives**

The Master of Science in Physics programme provides the candidate with knowledge, general competence, and analytical skills on an advanced level, needed in industry, consultancy, education, research, or public administration.

The work with the Master Thesis gives special expertise within one of the research areas represented at The Department of Physics: Astro and Particle Physics and Modern Field Theory, Biophysics and Medical Physics, Energy and Environmental Physics, and Optics and Condensed Matter Physics.



**Knowledge**

The candidate

- has substantial knowledge in physics, basic knowledge in mathematics, and knowledge in supported fields like computer science.
- has some research experience within a specific field of physics, through a supervised project (the Master Thesis).
- has advanced knowledge in some areas in physics.
- is familiar with contemporary research within various fields of physics.

**Skills**

The candidate

- has the background and experience required to model, analyse, and solve advanced problems in physics.
- is able to apply advanced theoretical and/or experimental methods, including the use of numerical methods and simulations.
- can combine and use knowledge from several disciplines.
- can critically and independently assess and evaluate research methods and results.
- has the ability to develop and renew scientific competence -- independently, via courses or through PhD studies in physics or related disciplines.
- is able to enter new problem areas that require an analytic and innovative approach.
- can disseminate subject matter and results to both specialists and a broader audience.

**General competence**

The candidate

- understands the role of physics in society and has the background to consider ethical problems.
- knows the historical development of physics, its possibilities and limitations, and understands the value of lifelong learning.
- is able to gather, assess, and make use of new information.
- has the ability to successfully carry out advanced tasks and projects, both independently and in collaboration with others, and also across disciplines.
- has an adequate background for pursuing pedagogic education.
- has an international perspective on her/his discipline.

## Study plan for Master of Science in Physics

Courses and ECTS Credits				
	7.5	7.5	7.5	7.5
2nd year 4th semester Spring	Master Thesis			
2nd year 3rd semester Autumn				
1st year 2nd semester Spring	<i>Elective course</i>	<i>Elective course</i>	Experts in Teamwork	Master Thesis
1st year 1st semester Autumn	<i>Elective course</i>	<i>Elective course</i>	<i>Elective course</i>	

The distribution of elective courses over the four semesters may be modified, in agreement with the supervisor.

**Examination:** The courses may have different examination forms, but most often an examination, oral or written, will be arranged at the end of the semester in which the course is offered.

For most examinations, including the thesis, the scale of grading is from A (highest) to E (lowest), or F (fail). Some courses are graded with “passed” or “not passed”/“failed”.

**Resit Examination:** All courses starting with the code FY and TFY have a resit examination in August. The ordinary examination is only held at the end of the semester the course is lectured. The resit examination is arranged only for candidates that can document approved absence or candidates that obtained the grade F or Failed at the ordinary examination.

**Exchange Studies:** It is possible to do studies at other universities during the Master’s Programme. Exchange studies have to be planned in collaboration with the supervisor, and approved by The Faculty of Natural Sciences and Technology. If exchange studies are considered, they are recommended to be done in the second semester. Exchange studies in the spring semester gives exemption from Experts in Teamwork.

## Information about the Master's Study

### Workload and structure

The programme requires two years of full-time study, beginning with the autumn term (medio August). The normal work load for a full-time student for one academic year is 60 ECTS credits.

The Master's study consists of two parts:

1. A written thesis of the project (Master thesis). The extent of the assignment should correspond to a work load of 60 credits. The work on the thesis is time limited. The thesis has to be submitted within May 15<sup>th</sup> of the 2nd year.
2. An approved selection of courses, a minimum of total 60 credits, from what (at least) 30 credits must be courses at 3000-level (master level) (UTF§14.1).

### Master's agreement

Every master student has to make a Master's agreement. This agreement comprises your syllabus and master project together with regulations for the counseling given during the master's study. The subjects, compulsory or elective, stated as syllabus in your Master's agreement cannot be changed. If there for serious reason develops a need for change, the Master's agreement must be revised. The supervisor, the responsible Department and the student must agree upon the revision and the new agreement filed.

### The Master thesis

The Master thesis should be developed as your own original work (with some support from your adviser). Any quotation, use of data, information etc. from other sources (including the scientifically literature and your fellow students) should therefore be carefully listed and included in the reference list of your thesis, according to best practice within your field of study.

### Submission and Examination

The student has to:

- Register for the final master's degree exam (through STUDWEB) within February the 15<sup>th</sup> of the 2<sup>nd</sup> academic year
- Apply for approval of your individual special syllabus. It is important that this is done well in advance of the examination. A study committee will evaluate the syllabus, and if it is not accepted, you must change it. Your supervisor must approve and sign the form.
- Hand in the thesis (within the deadline given) for print through [DAIM](#). The Department will give you 5 copies of the thesis.

In addition to the judgment of thesis, the candidate will have an oral exam consisting of:

- A conversation on/presentation ("defence") of the research assignment (the Master's Thesis)
- Examination on the special syllabus of the advanced courses which has previously not been evaluated during the study (at least 7,5 credits, preferentially individual

special syllabus). All exams, except the special syllabus (if any) have to be passed before the date of the final Master's Degree exam, unless otherwise stated in your Master's agreement.

- A "Special Syllabus" may be tailored to the thesis, and is normally composed by the supervisor and may consist of academic articles or a textbook related to the thesis. However, the Special Syllabus may be replaced by an ordinary course.

A grade is given for every course/special syllabus that constitutes a part of the exam.

### Important deadlines

- **15<sup>th</sup> of October (1<sup>st</sup> year):** Decide on a Master's project in cooperation with the supervisor.
- **15<sup>th</sup> of October (1<sup>st</sup> year)** Register your Master's agreement in [DAIM](#) and hand in the signed agreement, a project description and risk assessment of the project.
- **15<sup>th</sup> of February (2<sup>nd</sup> year):** Deadline for registration for the final Master's Degree exam (through STUDWEB)
- **15<sup>th</sup> of May (2<sup>nd</sup> year).** Deadline for the submission of the master thesis. If the thesis is not submitted within this date the grade "not passed" will be awarded, unless there is handed in an application for extension of the deadline in reasonable time before the deadline. The reasons given in the application must be in accordance with Supplementary Regulations for the Natural Sciences (UTF) § 20.3 and the Examination Regulations at NTNU, § 20. Alternatively such an application may be dealt with, taken into consideration The Supplementary Regulations for the Natural Sciences (UTF) § 7 and the Examination Regulations at NTNU, § 7 . See below for further information regarding §7 and §23.3.
- **15<sup>th</sup> of June (approximately, 2<sup>nd</sup> year):** is the date for the final Master's Degree exam. (Individual agreement with the respective Department, approximately four weeks after the thesis is submitted).

### Leave of absence from the Master Study (UTF § 7) (extract):

- a) Leave of absence from the master studies of two years of duration and from the two last year of master studies of five years of duration is normally not granted.
- b) Leaves of absence may nevertheless be granted when applied for and compelling circumstances are present. Such circumstances might be illness (yourself or among close family member) etc.

### Prolongation of the study (UTF § 20.3) (extract):

The master thesis is time limited. In case of illness, the deadline for handing in the thesis can be postponed equivalent to the time of absence due to illness. The illness must be documented by medical certificate.

If there is a valid reason for not handing in the thesis in time, one can apply for up to three months prolongation of the deadline. If the thesis is not handed in within the extended deadline, a new extension must be applied for, or else the candidate is regarded failed.

Delay of deadline can only be applied for twice.

Valid reasons for postponement (in addition to illness) is teaching, organized student activity, social work and unmerited problems concerning the thesis. Written documentation or statement is required, in addition to a new plan of completion. The Faculty, or Department when given the assignment by the Faculty, determines the application. When the reason for delay is teaching, organized student activity or social work, the extended time given is according to the time spent on these activities.

The agreed delay has no influence on the evaluation of the thesis.

### Course list

The list below gives an overview of courses on 2000- and 3000-level offered by the Department of Physics. Detailed course information is available at <http://www.ntnu.edu/physics/courses>

Code	Name	Semester	Level
FY2045	Quantum Mechanics I	Autumn	2000
FY2290	Energy Resources	Spring	2000
FY2302	Biophysics I	Autumn	2000
FY2450	Astrophysics	Spring	2000
FY3006	Sensors and Transducers	Autumn	3000
FY3114	Functional Materials	Autumn	3000
FY3201	Atmospheric Physics and Climate Change	Spring	3000
FY3403	Particle Physics	Autumn	3000
FY3452	Gravitation and Cosmology	Spring	3000
FY3464	Quantum Field Theory I	Spring	3000
FY3466	Quantum Field Theory II	Autumn	3000
FY3490	Physics, Special Syllabus	Autumn/ Spring	3000
TFY4185	Measurement Techniques	Autumn	2000
TFY4190	Instrumentation	Spring	3000
TFY4195	Optics	Spring	3000
TFY4200	Optics, Advanced Course	Spring	3000
TFY4205	Quantum Mechanics II	Autumn	3000
TFY4210	Quantum Theory of Many-Particle Systems	Spring	3000
TFY4220	Solid State Physics	Spring	3000
TFY4225	Nuclear and Radiation Physics	Autumn	3000
TFY4230	Statistical Physics	Autumn	2000
TFY4235	Computational Physics	Spring	3000
TFY4240	Electromagnetic Theory	Autumn	2000
TFY4245	Solid State Physics, Advanced Course	Spring	3000
TFY4255	Materials Physics	Autumn	3000
TFY4260	Cell Biology and Cellular Biophysics	Spring	3000

<b><u>Code</u></b>	<b><u>Name</u></b>	<b><u>Semester</u></b>	<b><u>Level</u></b>
TFY4265	Biophysical Micro Methods	Autumn	3000
TFY4275	Classical Transport Theory	Spring	3000
TFY4280	Signal Processing	Spring	3000
TFY4292	Quantum Optics	Autumn	3000
TFY4300	Energy and Environmental Physics	Autumn	2000
TFY4305	Nonlinear Dynamics	Autumn	3000
TFY4310	Molecular Biophysics	Autumn	3000
TFY4315	Biophysics of Ionizing Radiation	Spring	3000
TFY4320	Medical Physics	Spring	3000
TFY4330	Nano Tools	Spring	3000
TFY4335	Nano Life Science	Autumn	2000
TFY4340	Mesoscopic Physics	Spring	3000
TFY4345	Classical Mechanics	Spring	3000

## MASTER OF SCIENCE IN MATHEMATICAL SCIENCES

### *Master of Science in Mathematical Sciences for international students*

#### **Degree Program**

The degree program for the Master of Science in Mathematical Sciences for international students at NTNU is stipulated to take two years. One year of full studies corresponds to 60 credit points, i.e. in total 120 credit points are needed. The degree consists of two parts. The program starts with course work corresponding to 75 credit points and concludes with writing a thesis corresponding to 45 credit points.

#### **Admission requirements**

To be accepted as a student to this program one has to have:

- Bachelor's degree consisting of at least three years of university studies.
- Studied mathematics at a university for at least 1½ years.
- For the study directions in **algebra, analysis and topology**: Reached the level and covered material equivalent to
  - MA1101 Basis calculus I,
  - MA1102 Basis calculus II,
  - MA1201 Linear algebra and geometry,
  - MA1202 Linear algebra with applications,
  - MA1103 Vector calculus,
  - MA1301 Number theory,
  - MA2201 Algebra,
  - TMA4120 Calculus 4K.
- For the study direction in **numerical analysis**: Reached the level and covered material equivalent to
  - MA1101 Basic calculus,
  - MA1102 Basic calculus II,
  - MA1201 Linear algebra and geometry,
  - MA1202 Linear algebra with applications,
  - MA1103 Vector calculus,
  - ST1101 Probability,
  - ST1201 Statistical methods.

- For the study direction in **statistics**: Reached the level and covered material equivalent to
  - MA1101 Basic calculus,
  - MA1102 Basic calculus II,
  - MA1201 Linear algebra and geometry,
  - MA1202 Linear algebra with applications,
  - MA1103 Vector calculus,
  - ST1101 Probability,
  - ST1201 Statistical methods
 and at least two statistic courses on the level of ST2101 or TMA4250 or higher.

(All codes for these courses refer to the 2012/2013-course catalogue).

Applications for this program are filed through the <http://www.ntnu.no/intersek/> Office of International Relations. For further information and requirements see the homepage mentioned above.

### Description of the degree

All students are required to take the course “Interdisciplinary Teamwork, (Eksperter i Team)” (EiT). This should be done the second semester.

The Department of Mathematical Sciences offers various courses at graduate level in addition to more specialized graduate seminars. Currently we offer five directions of study, algebra, analysis (functional analysis and complex and harmonic analysis, differential equations), numerical analysis, statistics and topology.

**Algebra, analysis and topology:** All students must take at least 30 credit points amongst the courses

- MA3201 Rings and modules,
- MA3202 Galois theory,
- TMA4145 Linear methods,
- TMA4225 Foundations of analysis,
- TMA4190 Manifolds,
- MA3402 Analysis on manifolds

(unless the material has been covered in previous courses).

For the **algebra** direction, which builds upon MA3201 Rings and modules, MA3202 Galois theory, the courses MA3203 Ring theory and MA3204 Homological algebra should be taken. Some possible areas for topics for the thesis in algebra are presently representation theory of finite dimensional algebras, homological algebra and higher dimensional rings and orders.

For the **analysis** direction, which builds upon TMA4145 Linear methods, TMA4225 Foundations of analysis, the courses TMA4230 Functional analysis and TMA4175 Complex analysis should be taken. Some possible areas for topics for the thesis in analysis are presently geometric function theory, function spaces, harmonic analysis, continued fractions, dynamical systems, operator theory, topological measure theory and partial differential equations.

For the **topology** direction, which builds upon TMA4190 Manifolds, MA3402 Analysis on manifolds, the course MA3403 Algebraic topology I should be taken, and at least one more



topology course. Some possible areas for the thesis in topology are homotopy theory, K-theory, generalized cohomology theories, category theory, non-linear dynamics, Lie-groups and differential geometry.

**Numerical analysis:** If the admission background does not cover TMA4215 Numerical Mathematics and TMA4212 Numerical Solution of Differential Equations these should be taken. In addition TMA4220 Numerical Solution of Partial Differential Equations Using Element Methods and TMA4205 Numerical Linear Algebra should be taken. Some possible areas for the thesis in numerical analysis are numerical solution of ordinary and partial differential equations, numerical linear algebra and topics within computational sciences.

**Statistics:** For the statistics direction the courses TMA4295 Statistical inference and TMA4300 Computer intensive statistical methods should be taken. If the admission background does not cover TMA4265 Stochastic processes and TMA4267 Linear statistical models, the courses must be taken as part of the master program. Some possible areas for the thesis in statistics are biomodelling, computational statistics, design of experiments, functional genomics, life time analysis and spatial statistics.

As mentioned above, the coursework will take 2½ semesters (75/30 semester). All the courses in the degree must be approved by the Department of Mathematical Sciences, NTNU.

### The Thesis

The thesis could contain some independent research, but could also be of purely expository nature. The student may be required to follow seminars on the topic of the thesis. These seminars will in addition to the courses help the student to obtain the necessary background needed for writing the thesis. The work with the thesis should correspond to a workload of 45 credit points.

### Exams

The exam in each of the courses is either a written exam or an oral exam normally at the end of the semester when the course is taught.

### Academic year 2014 - 2015

From the academic year 2014 – 2015 the degree program for Master of Science in Mathematical Sciences for international students will merge with the Master's degree programme in mathematics and the Master's degree programme in statistics.

# EXAMINATION REGULATIONS AT THE NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY (NTNU)

*Adopted by the Board of NTNU on 7 December 2005 in accordance with the Act of 1 April 2005 relating to Universities and University Colleges, subsections 3-3, 3-4, 3-5, 3-9, 3-10 and 5-3. Changed by regulations 24 January 2006 no. 120, 12 October 2006 no. 1156, 22 May 2008 no. 504, 14 September 2010 no. 1587, 30 March 2011 no. 372, 12 October 2011 no. 1047, and on 13 June 2012 no 679*

## Chapter 1 Scope, Purpose and Definitions

### *§1 Scope and Purpose*

1. The regulations are valid for all studies at the Norwegian University of Science and Technology (NTNU).

2. The regulations contain rules about the organization of studies, examinations and assessment, requirements for the award of degrees, and regulations concerning the rights and obligations of the University and students at NTNU. The regulations are to ensure that studies and examinations at NTNU are carried out properly

### *§2 Definitions*

Final examination	A type of assessment that normally follows at the end of the semester under conditions that can be controlled. The final examination generally is the concluding assessment of the student in a course or a group of courses.
Course	The smallest unit in which the student can receive an assessment and course grade. The extent of the course is measured in credits. The course involves activities that form the basis for assessment. The activities may be compulsory.
Subject	A collection of courses in one group in a curriculum.
Main profile	Courses in a curriculum which are defined as belonging to the same discipline which can supplement each other and build on foundation course level in a programme of study. In case a Master's degree is based on a completed Bachelor's degree, the main profile contains the academic qualifications required for admission to the Master's degree.
Final grade	The grade given after a course or group of courses. It is based on the assessments that count during that course. The weighting of the grades in assessments during the course is stated in the course description.
Credits	Measure of the study workload. The normal workload in one academic year is 60 credits.
Programme of study	A group of courses that forms one academic entity that students can apply for admission to, receive the right to study, and leads to a degree.
Field of study	A specialization within a programme of study, which is described in the curriculum for that programme of study.
Assessment	The evaluations a student receives on the basis of his/her performance in a course, or a group of courses and that lead to a grade.

One-year programme A structured group of courses totalling 60 credits and having separate admission.

These regulations refer to the Act relating to Universities and University Colleges of 1 April 2005, no. 15.

## Chapter 2 Admission and individual education plan

### §3 Admission

The valid admission regulations are the relevant regulations adopted by the Ministry of Education and Research and NTNU's own admission regulations.

### §4 Admission to study and progress in studies

1. Admission involves the right to take the courses in the programme of study, a one-year programme or separate courses which the student has gained admission to. Admission provides the opportunity to take the courses specified in the individual education plan or in accordance with the progress in studies approved by the Faculty. Admission to study is valid from the day NTNU receives confirmation of the student's acceptance of his/her admission.
2. The right to take the programme of study which the student has been admitted to ceases when
  - the student fulfils the criteria allowing him/her to receive a certificate after completing the programme of study
  - the student has completed the one-year programme
  - the student's progress in studies is insufficient, according to the definition given in Section 4, subsection 3
  - the student himself/herself confirms that he/she has withdrawn from the programme of study before it is completed
  - the student has not paid the semester fee by the stipulated deadline, see Section 6.
3. In programmes of study that are divided into year courses/ years, a student cannot take the next year if he/she has an outstanding deficit of more than 22.5 credits from the two previous years. Students who want to take the 4<sup>th</sup> year cannot have any unfinished courses from the 1<sup>st</sup> year. Students who want to take the 5<sup>th</sup> year cannot have any unfinished courses from the 1<sup>st</sup> and 2<sup>nd</sup> years, and students who want to take the 6<sup>th</sup> year cannot have any unfinished courses from the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> years.  
 The student loses the right to study a programme of study if he/she has an outstanding deficit of more than 22.5 credits. No student is permitted to use more than 2 academic years to take the same year in a programme of study. The time spent in each year should be adjusted according to any leave that has been granted, and any possible reductions in the study progress (part-time studies) that have been approved in the individual education plan, ref. Sections 5, 7, and 8.  
 It is to be evident from the curriculum whether the programme of study is divided into years, ref. Section 14, subsection 1.  
 Students that apply for re-admission to the same programme of study will, if applicable, be given recognition of previous studies in the year the student is admitted to. The same is true when there is great degree of similarity between a programme of study a student has applied for admission to and another programme of study a student has or had been admitted to. Exemption to this regulation can be made when more than three years have elapsed since the student was admitted to the other programme of study. Rector is to decide the matter.
4. The Faculty is to decide whether the right to study should be terminated in accordance with the above regulations. The Faculty may grant exemptions from the regulations in Section 4, subsection 3 in cases of illness, serious family problems, when the main part of the studies has already been completed, extraordinary conditions related to the subject (taking the next year) or other reasons found to warrant special treatment.
5. A student who is not covered the regulations in Section 4, subsection 3 has admission withdrawn if he/she has not earned any credits during one academic year in the programme of study or one-year programme that the student is admitted to. This does not apply if the student has registered for and been present at one or more examinations and when it is agreed in the

individual education plan that the student is not to earn any credits. The Faculty is to decide in matters of withdrawal of admission.

6. A student who has gained admission to a programme of study and has had normal progress (without adjustment for leave or reduced progress in studies), is not to be affected by changes in the disciplinary objectives, level and structure of the programme while completing his/her work on the programme. The student nevertheless has to accept that there may be changes in the courses and the structure of the programme of study that will not cause a delay in his/her progress.
7. A student who has gained admission to a programme of study, one-year programme or individual courses at NTNU, has the right to follow other courses he/she is qualified to take and receive assessment of his/her performance in these courses. The student also has the right to follow lectures in courses outside the programme of study or one-year programme if there are no restrictions on the admission to the courses. The student maintains these rights also after having completed the programme of study.

### ***§5 Individual education plan***

The Faculty together with students who have gained admission to study for 60 credits or more are to agree on an individual education plan before the end of the first semester. The individual education plan can be amended in agreement with the Faculty. The individual education plan is a mutual agreement between the student and NTNU concerning the duties and responsibilities of each party for progress in studies as well as the duties and responsibilities of each student towards his/her fellow students. The individual education plan gives the content and progress of the planned studies, cf. Section 6, subsection 2.

### ***§6 Registration***

1. Students who have been admitted to NTNU have to register and pay the semester fee at NTNU each semester by the deadline set by the Rector. The deadline is given in the curriculum and on NTNU's Internet pages. Students who do not pay the semester fee by the stipulated deadline will have their admission withdrawn in accordance with the regulations relating to Student Welfare Organizations of 12 February 2001, Section 10. The Faculty is to decide in matters of withdrawal of admission due to non-payment of the semester fee.
2. For students who have agreed to an individual education plan, this registration is to determine and confirm the information in the plan for the current semester concerning
  - which courses the student will attend
  - which courses the student is to be given assessment in
  - other possible activities determined in the programme of study which the student follows
  - other information where adjustments are possible and which is relevant for the student's progress in his/her studies.
3. Students who are not obliged to agree on an individual education plan or who have not yet entered into an individual education plan also have the duty to register. This registration is to indicate which courses the student will attend and receive assessment in.
4. The registration gives access to the resources offered by NTNU in order to enable the student to complete his/her courses that semester.

### ***7 Leave of absence***

1. The Faculty is to handle applications for leave of absence. Such leave from study is primarily given for one academic year. For shorter periods, leave can be given until the end on the semester. A student must have completed more than 30 credits in the courses included in the programme of study in order to apply for leave of absence without stating a reason.
2. The Faculty may accept an application for leave for more than one academic year if there are special circumstances or pressing reasons, such as illness, extensive demands for child-care etc., military service or civilian service.
3. The student must accept that there may be changes in the programme of study during a period when he/she has a leave of absence.

**§8 Part-time studies**

Studies at NTNU may be taken on a part-time basis following agreement with the Faculty. The percentage of the nominal progress in studies is to be included in the individual education plan.

**§9 Students without the right to study**

1. Those who have not been granted admission have the right to receive assessment in a course in accordance with the Act relating to Universities and University Colleges, Section 3-10. The Faculty decides whether the requirements for registration have been fulfilled and may specify further regulations concerning assessment in the absence of normal admission.
2. The Rector may decide upon a special deadline for registration for this type of assessment. The Rector can also decide that those who have not been admitted as students should pay an examination fee in order to cover the extra cost of carrying out such assessments.

**§10 Teaching – delegation of authority in accordance with the Act relating to Universities and University Colleges, Section 3-8**

1. The Faculty has the authority to reserve certain lectures just for the students of the University or specified groups of students if the nature of the lectures makes this necessary, cf. the Act relating to Universities and University Colleges Section 3-8, subsection 2.
2. The Faculty has the authority to allow people who are not following normal courses to attend lectures and participate in exercises whenever there is sufficient space.

**§11 Suspension, exclusion – delegation of authority in accordance with the Act relating to Universities and University Colleges, Section 4-8, subsection 1**

1. In cases where a student behaves in a way that seriously disturbs the work of fellow students or the general activities of the University, the Faculty has the authority to give a written warning stating that if such behaviour is continued a recommendation concerning suspension will be presented to the Board. In cases that are not specifically related to an individual Faculty, this authority rests with the Rector.
2. The Faculty has the authority to give a written warning to a student that an exclusion recommendation will be presented to the Board unless the suspension decision made by the Board is respected. In cases that are not specifically related to an individual Faculty, this authority rests with the Rector.
3. Complaints about decisions involving a written warning should be sent to the Appeals Committee at NTNU.

**Chapter 3 Organization of studies****§12 The academic year**

1. The academic year consists of 40 weeks and is divided into two semesters. The autumn semester extends over 19 weeks and finishes before the end of the year. The spring semester lasts 21 weeks.
2. The Board of NTNU may approve that a programme of study at NTNU deviates from the ordinary structure described in Section 12, subsection 1 if the duration of the programme is more than 40 weeks and has teaching and/or studies which can be pursued independently of the other studies at NTNU.

**§13 Programmes of study**

1. Programmes of study at NTNU are organized according to the following models, they can
  - lead to a Bachelor's degree which subsequently forms the basis for a Master's degree.
  - be an integrated study which leads to a Master's degree or a professional degree
  - lead to a Master's degree which is based on a completed Bachelor's degree or equivalent education.

The Board establishes and terminates each programme of study at NTNU. When the Board creates a new programme of study, it should simultaneously decide which Faculty is to administer the programme.

2. Each programme of study has a main profile, which gives disciplinary specialization of at least 80 credits. All programmes of study involving 5-year integrated Master's degrees should also satisfy the requirements of the Bachelor's degree.
3. Each programme of studies consists of different courses. The courses offered should each be of 7.5 credits or a multiple of that. The courses given in the programme of study are either compulsory or optional. The Faculty establishes new courses and terminates old ones. For the Master of Science in Engineering programmes, the Rector has this authority. For courses in the 5-Year Teacher Education programmes, the Faculty exercises this authority in consultation with Rector. The Board at NTNU is to approve the establishment of courses where it is assumed that this will increase the basic disbursement in the State appropriation model.
4. All programmes of study leading to a lower degree as well as integrated programmes of study leading to a higher degree or a professional degree are to contain three introductory courses:
  - a) Ex. phil. of 7.5 credits. 2/3 of the Ex. phil. is to be common for all students at NTNU. Ex. phil. should be suited to the disciplinary area but the variations are up to 1/3 of the content. The curriculum is to indicate the specific variety.
  - b) Ex. fac. of 7.5 credits is specific for the relevant Faculty. It should be part of the main profile is and is to be taken in the first year.
  - c) Perspective course of 7.5 credits that is to represent a different field of study from that included in the student's programme of study.
 Rector is to decide the detailed regulations for the introductory courses considering the recommendations from the Education Committee.

### ***§13a One-year programmes***

The Rector is to establish and terminate each one-year programme at NTNU following a recommendation from the Education Committee. The rector is also to decide which Faculty is to administer each one-year programme.

### ***§14 Curriculum and course description***

Each programme of study is to be described in a curriculum. The Faculty administering the programme of study is to approve the curriculum. Rector is to approve the curricula for the Master of Science in Engineering programmes and the 5-Year Teacher Education programmes.

The curriculum should contain information about possible admission requirements and ranking regulations for the programme of study. The curriculum should stipulate:

- the learning outcomes and professional objectives of the programme of study
- any required previous knowledge for the programme of study
- which Faculty is to administer the programme of study
- which courses are included in the programme of study
- the scope of the programme of study in terms of credits
- what course combination meets the required main profile
- the structure of the programme of study, whether the programme of study has been divided into years, the fields of study, which are the common courses, which are compulsory and optional courses, and the sequence of the courses
- the possibilities for student exchanges abroad
- other issues which affect the implementation and quality assurance
- transitional arrangements as a result of changes in the curriculum.

All courses are to be presented in a course description. Each Faculty is to provide a description of its own subject areas. Each course description should include:

- learning outcomes
- the qualifications necessary to gain admission to the course
- the content of the course
- teaching methods

- how many credits the course is worth
- the extent of the education
- possible compulsory education
- which activities are included, their extent and which of them are compulsory, for instance courses in methodology, exercises, work experience, field courses, excursions, laboratory work, group exercises, semester papers and other written exercises, artistic performances
- the requirements for receiving assessment
- activities that will be subject to on-going assessment and which of them will count in the course grade
- the organization of a possible final examination (how often, when in the semester, date and similar information)
- what examination support material can be used
- the form of assessment and grading scale for the assessments during the course
- the weighting of assessments during the course that are to count in the course grade

#### ***§15 Recognition of external studies/practical experience***

1. The Faculty is to handle applications concerning recognition of external studies or practical experience in accordance with the Act relating to Universities and University Colleges, Section 3-5. A condition is that the external education has been approved as education at university or university college level.
2. The Faculty is to handle applications concerning the approval of an equivalent degree or education in accordance with the Act relating to Universities and University Colleges, Section 3-5.

#### ***§16 Exemption from assessment***

1. The Faculty is to grant exemption from the final examination, test or other assessment in cases where the student can document that similar assessment has already been done by NTNU or another institution. The Faculty may also grant exemption on basis of other recognized examinations, tests or other kinds of assessment, or on basis of documented practical experience, in accordance with the Act relating to Universities and University Colleges, Section 3-5. When processing such applications for exemption, the Faculty should take both a student's previous education into account, as well as the assessment in terms of level, scope and content.
2. The student is to send such an application to the Faculty that administers the programme of study in which he/she has the right to study.

#### ***§17 Reduction of credits***

If a student receives assessment in courses where the content wholly or partially overlaps, the total of credits for these courses should be reduced accordingly. The Faculty decides the extent of the reduction in each separate case. If some of the courses to which the student has gained admission to are compulsory, the reduction should take place in the optional courses. The reduction should be done in a way that provides the student with the best grade that has been awarded. The basis for the reduction should be evident from the transcript or certificate.

## **Chapter 4 Degrees**

#### ***§18 Awarding degrees***

The Faculties award degrees with their respective titles in accordance with their delegated responsibility from the Board when the latter approves a new programme of studies.

**§19 Bachelor's degree**

1. The Faculty awards the Bachelor's degree on basis of a completed programme of study or a free selection of courses in cases where the student has completed a total of 180 credits. The 180 credits should include:
  - a main profile of at least 80 credits, where the curriculum defines the requirements of the main profile
  - introductory courses of 22.5 credits, ref. Section 13, subsection 4.
2. If the Bachelor's degree is not based on an established programme of study, the Faculty that awards the degree is to cover the area where the major part of the disciplinary content belongs. If the student has a degree where more than one major parts are included, the student can decide which of the relevant faculties should award the degree.

**§20 Master's degree**

1. In order to gain admission to a Master's programme which is based on a lower degree, the student must
  - have been awarded a Bachelor's degree or its equivalent
  - have received a passing degree in courses corresponding to 80 credits in the subject area of the relevant Master's degree, as specified in the curriculum for the relevant Master's programme
  - have fulfilled the other requirements for admission, as specified in the curriculum for the Master's programme.
 When admission to a Master's programme is based on experience, the second point is not valid.  
 Instead, at least 2 years of relevant professional experience is demanded.
2. In order to receive a Master's degree, the student must
  - either satisfy the admission criteria of the Master's programme and in addition have passes in relevant studies corresponding to 120 credits, where the curriculum allows 30 credits to be replaced by relevant practical experience
  - or have completed a course of studies corresponding to 300 credits, where the requirements of the Bachelor's degree are included.
3. In the Master's programme described in Section 20, subsection 2, a Master's thesis corresponding to at least 30 credits, but no more than 60 credits, should be included.
4. In order to receive a Master's degree corresponding to less than 90 credits, the specified requirements relevant for such a degree programme must have been met.

**§21 Candidata/candidatus medicinae**

In a programme of studies leading to the degree *candidata/candidatus medicinae*, introductory courses as defined in Section 13, subsection 4 are included. The degree is based on a coherent course of study corresponding to 360 credits. The Faculty of Medicine will decide the content of the programme of study as well as additional criteria for awarding the degree.

**§22 Candidata/candidatus psychologiae**

In a programme of studies leading to the degree *candidata/candidatus psychologiae*, introductory courses as defined in Section 13, subsection 4 are included. The degree is based on a coherent professional study corresponding to 360 credits. The Faculty of Social Sciences and Technology Management will decide the content of the programme of study as well as additional criteria for awarding the degree.

**Chapter 5 Assessment****§23 Assessment**

1. In all courses or groups of courses included in a programme of study, the possibility for assessment and subsequent grading of the knowledge and skills of the students should be available each academic year. The assessment should be given as a final evaluation, or



possibly an evaluation based on different types of on-going assessments described in the curriculum.

2. In order to receive assessment, the student must have registered that same semester, and also meet the academic requirements for assessment given in the course description.
3. A student who has handed in a paper in an assessment cannot prevent the assessment from being done. The student cannot block an assessment if the examination began with an oral test.

#### ***§24 Examination periods***

Final examinations take place at the end of each semester. The Rector decides the time of the examination periods. The dates are given in the curriculum. The Rector may decide to organize the examinations outside the regular examination periods, if practical considerations related to the courses or other things make this necessary.

#### ***§25 Final examination***

The course description states whether the course is to be concluded with a final examination and what requirements the student has to satisfy in order to sit the final examination. A grade is always awarded at the final examination.

#### ***§26 Instructions at final examination***

The Rector can issue general instructions for

- students who are allowed to sit a final examination
- invigilators
- the presence of teaching staff during a written final examination.

These instructions are found in the curriculum.

#### ***§27 Legitimate leave of absence at final examination***

1. If a student is unable to sit a final examination due to illness or other pressing reasons, an application for approved absence has to be submitted to the Division of Student and Academic Affairs. The application, which has to be submitted at the latest one week after the first final examination to which the absence applies, has to contain information about which final examinations the application concerns. Documentation should be included in the application. The period of absence is to be indicated on the medical certificate.
2. A student who is taken ill during a final examination should notify the principal invigilator in the examination hall or the external examiner/internal examiner at oral examinations. The student subsequently has to see a doctor quickly and submit a medical certificate, as stated in the regulations in Section 27, subsection 1.

#### ***§28 Re-sit examination***

1. In a course where the final examination is to be held only once in the academic year, a re-sit examination is to be arranged before the next normal examination. Students with an approved absence may take the re-sit examination. This also applies to students who have not passed the initial examination.
2. Students must register for the re-sit examination within the deadline stated by the Faculty or in the supplementary regulations.
3. The Faculty can in agreement with the Rector decide to organize the re-sit examination during the same period as the normal examination, in the next examination period or at a later time outside the examination period. For certain programmes of study, the time of the re-sit examination will be a standard arrangement that can be stated in the supplementary regulations.
4. During a re-sit examination, the quality of the assessment should correspond to the one given at the normal final examination. Alternative forms of assessment at re-sit examination should be stated in the course description.

**§29 Approved absence from other types of assessment than final examination**

The Faculty should, if practically possible, ensure that students with approved absence from other types of assessment than in the final examination can be assessed during the semester and before any possible final examination in the course.

**§30 Re-examination**

1. A student who has failed to pass the examination in a course has the right to repeat the examination and receive a new assessment. The course description or the supplementary regulations determine what areas have to be repeated after a student has failed to pass an examination.
2. The student has the right to complete a second period of practical work experience if he/she failed to pass the first period of practical work experience.
3. If the student has passed, he/she only has the right to re-take an examination once more in each course in order to improve his/her grade. If the student is registered for an examination and has not withdrawn his/her examination registration by the deadline decided by the Director of the Student and Academic Division, this is regarded as one attempt. The highest grade obtained is the one that counts. When the grade for a course is based on two or more assessments or tests, all of these have to be re-taken.

**§31 New assessment of Master's thesis**

A student may submit a new or revised Master's thesis once in cases where the thesis has not been awarded a passing grade. If the thesis has been given a passing grade, there is no opportunity for a new assessment in the same programme of study.

**§32 Syllabus at new assessment/re-sit examinations**

In case of new assessment and re-sit examinations, the syllabus of the course at the time of the new assessment or the re-sit examination is to be valid. In cases of changes in the national framework plans, the Ministry may decide upon special arrangements. If there are significant changes in the syllabus, there is to be a possibility to be assessed according to the former syllabus for at least one year, but no more than two years after the introduction of the changes.

**§33 Adjusted forms of assessment**

1. In order to give all students approximately the same working conditions when receiving assessment, students with particular requirements that have been sufficiently documented may apply for an adjusted form of assessment. Such an assessment does not imply any reduction in the general degree requirements.
2. The adjusted forms of assessment may be practically oriented in order to allow the use of special aids or extended time. In particular cases, types of assessment that differ from the normal one may also be accepted.
3. If the requirements of the student are permanent, the use of special aids may be allowed throughout his/her studies.
4. An application, including documentation, should be sent to the Division of Student and Academic Affairs before the registration deadline. The application is to be decided by the Rector. Applications for different forms of assessment from the one given in the course description are to be decided by the Rector in consultation with the Faculty.
5. Students with sudden acute requirements should as far as possible be given the same rights with regard to assessment as described above. An application containing sufficient documentation should be sent to the Division of Student and Academic Affairs as soon as possible after the acute situation has arisen.

**§34 Form of language/language by written assessment**

1. Arrangements with regard to the form of language used in examination papers are given in

Regulations concerning forms of language in examination papers of 7 July 1987. The regulations are in accordance with the Act of 11 April 1980 no. 5 concerning the use of Forms of Language in the Public Services.

2. Examination papers written in Norwegian should contain a version in the other form of the Norwegian language (*bokmål* and *nynorsk*). The exception is examination papers in the subject Norwegian. In case all the students prefer the same form of language, the examination papers may only be written in this form. The students choose their form of language as they register for an examination.
3. If the lectures are given in a non-Scandinavian language, the examination paper should also include a version in the language that has been used in the lectures. Applications requesting the examination paper to be in a language different from Norwegian or that used in teaching are to be decided by the Faculty.
4. In examinations at higher degree level, the Faculty may decide that the text in the examination paper is in a non-Scandinavian language even though there is no requirement that the examination answer paper is to be written in that language. Higher degree level means master's programmes or the 4<sup>th</sup>, 5<sup>th</sup> or 6<sup>th</sup> years in integrated programmes of study. The decision concerning this is to be indicated in the course description.
5. If a significant portion of the curriculum of the course is written in a language that is different from the one used in lectures, the Faculty may decide that the examination paper should contain a version in this language as well.
6. Assessment papers and Master's theses can be written in Norwegian, Danish, Swedish or English unless stipulated otherwise in the course description or in description of the programme of study.
7. If another foreign language than English is part of the characteristics of the course, its learning objectives or curriculum, the Faculty is to determine which language the candidate is to use in his/her assessment paper.
8. The Master's thesis is to be written in the language that is most relevant to the content of the topic and the practical conditions of each individual master's student. The Faculty is to determine which languages can be approved within this framework. Master's theses that are written in Norwegian are to have a summary in English or another relevant language. Master's theses written in a non-Scandinavian language are to have a short summary in Norwegian. The Faculty may waive this provision if the candidate is an international student and does not speak one of the Scandinavian languages (Norwegian, Swedish or Danish).

### ***§35 Oral examinations behind closed doors***

At the request of the student, the Faculty may decide against making an oral examination public in cases where there are pressing reasons, ref. the Act relating to Universities and University Colleges, Section 3-9, subsection 3. The Faculty should ensure that the assessment in these cases also satisfies the normal academic level in the programme of study.

### ***§36 Academic misconduct or an examination offence/attempted academic misconduct or an examination offence***

1. In cases of academic misconduct or an examination offence/attempted academic misconduct or an examination offence, the University Appeals Committee may cancel the assessment in accordance with the Act relating to Universities and University Colleges, Section 4-7. The same applies to the recognition of courses, credits or education, as well as exemption from assessment.
2. In accordance with the Act relating to Universities and University Colleges, Section 4-8, subsection 3, the University Appeals Committee may expel a student who has behaved contrary to the regulations for up to one year. The student may also lose his/her right to sit for examinations within institutions affected by the ruling for up to one year.
3. More detailed information about reactions to academic misconduct or an examination offence is given in Guidelines for reactions to academic misconduct or examination offences/attempts at academic misconduct or examination offences at NTNU of 30 May 2001.

## Chapter 6 Determination of grades

### §37 Examiners

1. The Faculty appoints the examiners, ref. the Act relating to Universities and University Colleges, Section 3-9, subsection 2. For inter-faculty courses such as “Experts in Team” that are not administered by one faculty, the rector is to appoint the external examiner(s). If there is an appeal, the Faculty is to appoint the external examiner(s). The examiners are appointed for 3 years at a time.
2. At least two examiners are to be present at oral examinations and assessment of vocational training or other activities of a type that cannot be subsequently checked. At least two examiners, of whom at least one should be external, should be present at the assessment of Master’s theses, ref. the Act relating to Universities and University Colleges, Section 3-9, subsection 2.
3. The Faculty determines the guidelines regarding external participation at the assessment, whether general or a specific programme of study. This could be done by external participation in each separate assessment or through an external evaluation of the assessment procedures.

### §38 Deadlines for determination of grades

In accordance with the Act relating to Universities and University Colleges, Section 3-9, subsection 4, the deadline for determination of grades is 3 weeks following the examination, unless special reasons make it necessary to use more time. When special reasons occur, a new deadline should be announced. The deadline for assessment of the Master’s thesis is 3 months after the thesis has been handed in.

## Chapter 7 Grades

### §39 Grading scales

Assessment is given on basis of grading, either through a scale ranging from A to F or on the basis of Passed/Not Passed. Grade A is the highest pass grade, while Grade E is the lowest pass grade. The grading scale is based on the following descriptions and general qualitative descriptions:  
symbol description General, qualitative description of valuation criteria

Symbol	Description	General, qualitative description of valuation criteria
A	Excellent	An excellent performance, clearly outstanding. The candidate demonstrates excellent judgement and a high degree of independent thinking.
B	Very good	A very good performance. The candidate demonstrates sound judgement and a very good degree of independent thinking.
C	Good	A good performance in most areas. The candidate demonstrates a reasonable degree of judgement and independent thinking in the most important areas.
D	Satisfactory	A satisfactory performance, but with significant shortcomings. The candidate demonstrates a limited degree of judgement and independent thinking.
E	Sufficient	A performance that meets the minimum criteria, but no more. The candidate demonstrates a very limited degree of judgement and independent thinking.
F	Fail	A performance that does not meet the minimum academic criteria. The candidate demonstrates an absence of both judgement and independent thinking.

Passed/Not Passed is used where assessment is not required.

The Faculty is to provide descriptions of the assessment criteria that are specific for each subject.

#### ***§40 Grade Point Average***

The Grade Point Average can be estimated as long as letter grades have been given for at least 75% of the credits. When estimating the Grade Point Average, all grades in each separate course should be included.

The Grade Point Average is determined as follows:

1. Each letter grade is replaced by its equivalent number, A=5, B=4, C=3, D=2, E=1.
2. The numerical equivalent is multiplied by the number of credits in the course, and the separate sums of credits and numerical equivalents are added up for all courses that are included.
3. This total is subsequently divided by the total number of credits included in all the courses.
4. The quotient is calculated to one decimal place.
5. The Grade Point Average is the letter degree which represents the equivalent of the full number of the quotient after the normal rounding-up rule has been applied.

#### ***§41 Final grade***

1. Whether or not a final grade is to be given is decided by supplementary regulations.
2. The final grade means the overall grade for the entire programme of study at the award of degree. The grade is a weighted average based on the letter grades in the courses included in the degree. In order to get a final grade the student must have a pass mark in courses at NTNU corresponding to at least 120 credits, and at least 75% of these must have been given a letter grade. The method for calculating the final grade is the same as that described for the Grade Point Average in Section 40.

#### ***§42 Explanations and appeals***

1. Cases involving the explanation of grades and complaints about them are to be handled in accordance with the Act relating to Universities and University Colleges, Section 5-3. Requests for an explanation of grades and complaints should be forwarded to the Faculty. Guidelines for examiners are to be issued in connection with each examination question paper. These guidelines are to be available for students after the examination grade is decided.
2. If there is a new assessment of a grade, at least two new examiners, including at least one external, are to be involved, ref. the Act relating to Universities and University Colleges, Section 3-9, subsection 5. The new examiners should not have any information about the initial grade, the explanation for it or the basis of the student's complaint. If the examiner(s) in the first assessment find passages that are copied without citing the sources, but situation is not considered serious enough to be termed academic misconduct, the department may be notified by the examiner(s). If the student lodges a complaint about the grade he/she has received, the department is allowed to inform the new examiners about the lack of source citation. The department is to inform the student that the new examiners will be informed about the lack of source citation.
3. When on-going assessment is used, the student cannot lodge a complaint until he/she has received the grade in the relevant course or group of courses. Although the student cannot lodge a complaint following each separate assessment, he/she has the right to an explanation of the grading for each separate assessment.
4. Complaints against procedural errors can be submitted in accordance with the Act relating to Universities and University Colleges, Section 5-2. The complaint is to be sent to the Faculty. In accordance with Section 5-2 of the Act relating to Universities and University Colleges, complaints can only be made about on-going assessments which will be included in the certificate or that count as part of the final grade.
5. Complaints about the grading of group work, where a common grade is given, all participating students must agree and sign the complaint. The same applies to complaints about procedural errors in these cases.

## Chapter 8 Certificates and transcripts

### *§43 Certificates*

1. Certificates are issued after the completion of a degree or an educational programme. A certificate is normally issued only once for the same degree/education. The certificate is to contain information about the programme of study the degree is based on. The certificate should show the semester and year the degree/educational programme was completed. The final grade (if applicable) is to be given on the certificate. Diploma supplements form a part of the certificate. A transcript of grades showing the courses the student has passed should be attached to the certificate.
2. In order to receive a certificate for a completed degree at NTNU, at least 60 of the credits to be included in the basis of calculation of the degree have to be taken at NTNU.
3. For the degrees that are awarded in cooperation with other Norwegian or foreign institutions (joint degrees) at least 30 credits have to be taken at NTNU.
4. When recognition is given for education that has previously been used in the basis of calculation of a degree or as part of a degree or professional training, a student must also have completed at least 60 new credits before he/she can be awarded a new degree. The Faculty may decide requirements for up to 90 new credits for certain programmes. Rector has the authority to adopt requirements for up to 90 new credits for the Master of Science in Engineering programmes and the 5-Year Teacher Education programmes.

### *§44 Transcript*

Upon request, students are to receive a transcript confirming their passing grades. The transcript should show the grades given in each course, the year and semester in which the grades were obtained, as well as the title and number of credits for the courses.

## Chapter 9 Supplementary regulations and implementation

### *§45 Supplementary regulations*

The Faculty has the authority to add supplementary regulations to these regulations. For inter-Faculty programmes of study, the supplementary regulations are to be accepted by all faculties involved. For the Master of Science in Engineering programmes and the 5-Year Teacher Education programmes, Rector has the authority to add supplementary regulations.

### *§46 Implementation*

The regulations are to come into force immediately.

## EXTRACTS FROM ACT OF 1 APRIL 2005 RELATING TO UNIVERSITIES AND UNIVERSITY COLLEGES

### Chapter 3 Academic decisions - accreditation

#### § 3-9. Examinations and marking

1. Universities and university colleges shall ensure that students' knowledge and skills are tested and assessed in a manner that is impartial and academically sound. Assessment shall also safeguard the academic standards of the course of study in question. An external evaluation shall be made of the assessment or assessment arrangements.
2. The board shall appoint examiners for examinations, tests, assessments of assignments or other assessments the results of which are entered on the diploma or included in the mark given for the course of study in question. When assessing candidates' independent work in higher degree courses, each candidate shall be assessed by at least two examiners, of whom at least one shall be external.
3. The oral parts of examinations and tests shall be public unless regard for the examination or test arrangements indicates otherwise. The board may make exceptions to the rule concerning public examinations in particular cases at the request of the examination candidate concerned when particularly weighty reasons so indicate.
4. Marks shall be made known within three weeks unless for special reasons more time is required. The board may itself make exceptions in respect of specific examinations and may in temporary regulations pursuant to the seventh paragraph set a longer time limit when it is not possible to provide the number of qualified examiners required to complete the marking within three weeks. The board may itself in a regulation pursuant to the seventh paragraph set a longer time limit for dissertations and similar large written works.
5. Re-marking pursuant to sections 5-2 and 5-3 shall be carried out by at least two new examiners, of whom at least one shall be external. Marks may be changed in the appellant's favour and disfavour. If the final mark is set on the basis of both a written and an oral test and an appeal against a mark for the written part of the examination is upheld, a new oral test shall be held to determine the final mark.
6. The mark awarded following an examination, test, assessment of an assignment or other assessment shall either be pass/fail or be based on a graded scale of six marks from A to F, where A to E indicate a pass and F indicates a fail.
7. The board itself issues regulations governing the taking and arrangement of examinations and tests, including the conditions for resitting an examination or test and for permission to retake a practice period, and provisions concerning registration and the conditions for registration for examinations. In the case of courses for which national curriculum regulations have been established pursuant to section 3-2, second paragraph, the regulations must be based on any general provisions concerning examinations and assessment contained in the curriculum regulations. The board may delegate the issue of supplementary provisions concerning special circumstances relating to particular examinations to a faculty or department.

### Chapter 4 The students' rights and obligations

#### § 4-7. Annulment of examinations or tests

1. The board itself or the board's appeals committee, cf. section 5-1, may annul an examination or test or recognition of a course if the student
  - a) by using a false diploma or by other dishonest means, has gained admission to the examination or test or to attend the course concerned, or
  - b) has attempted to cheat or wilfully or through gross negligence has cheated in the course of or prior to the final assessment of the examination or test concerned, or while taking the course in question.
2. The board itself or the institution's appeals committee, cf. section 5-1, may annul credit for or recognition of a course or exemption from an examination or test if the student obtained it by using a false diploma or by other dishonest means.
3. Annulment decisions pursuant to the first and second paragraph may be appealed to the Ministry or to a special appeals body appointed by the Ministry, cf. section 5-1, seventh paragraph.
4. The right to annulment has no time limit.
5. An annulment decision entails an obligation to return any diplomas or mark transcripts to the institution. If such diploma or mark transcript is not returned to the institution at the proper time, the institution may obtain the assistance of an enforcement officer (namsmann) to secure its return, pursuant to the provisions laid down in Chapter 13 of the Enforcement Act.
6. If the diploma can form the basis of authorization for the exercise of a profession or trade, the institution shall notify the authority concerned of the annulment.

7. Other institutions under the present Act may be informed of the annulment of an examination or test. The Ministry issues specific provisions concerning information routines, etc.

#### § 4-8. *Exclusion*

1. A student who despite written warning by the board repeatedly behaves in a manner which seriously disturbs the work of fellow students or other activities at the institution may be excluded by the board itself or the institution's appeals committee, cf. section 5-1, from specific parts of the institution for up to one year. If a student after receiving a written warning from the board continues not to respect such exclusion, the board itself or the institution's appeals committee, cf. section 5-1, may exclude him or her from attending courses for up to one year.
2. A student who has behaved in such a seriously censurable manner as to endanger the life or health of patients, clients, children attending a day care institution, pupils or others with whom the student comes into contact in connection with clinical or practical training or who in relation to such persons commits serious breaches of the obligation to observe secrecy or behaves with gross indecency, may, if the board itself or the institution's appeals committee, cf. section 5-1, so decides, be excluded from attending courses for up to three years. The institution shall inform the Norwegian Directorate for Health and Social Welfare of any exclusion pursuant to this provision of students attending courses that may result in a right of authorization pursuant to section 48, first paragraph, of the Health Personnel Act.
3. A student who has behaved as described in section 4-7, first or second paragraph, if the board itself or the institution's appeals committee so decides, cf. section 5-1, may be excluded from the institution and deprived of the right to sit examinations at institutions under this Act for up to one year. The Ministry issues specific provisions concerning information routines, etc.
4. A decision to exclude a student requires a majority of at least two-thirds. The student may appeal against such a decision pursuant to the provisions laid down in the Public Administration Act. The Ministry or a special appeals body appointed by the Ministry is the appeals body.
5. The student is entitled to seek the assistance of a lawyer or other spokesman from the date the question of exclusion is raised or from the date of any written warning pursuant to the first paragraph. The cost of such assistance shall be met by the institution.

## Chapter 5 Appeals

#### § 5-2. *Complaints against procedural errors in connection with examinations*

1. A candidate who has taken an examination or test may complain of procedural errors within three weeks of the date when he or she became or should have become aware of the circumstance on which the complaint is based. Such complaints are ruled on by the board itself or the institution's appeals committee. 1 April 2005
2. If an error was committed which may have affected the student's performance or its assessment, the mark shall be rescinded. If the error can be corrected by remarking the papers submitted, they shall be re-marked. Otherwise a new examination or test shall be held with new examiners. The mark awarded in a second assessment pursuant to the present section may be appealed against pursuant to the provisions laid down in section 5-3.
3. If a request for explanation of or an appeal against a mark has been submitted, the time limit for an appeal pursuant to this section is reckoned from the date when the student receives the explanation or when the appeal is finally ruled on.
4. If the board or the board's appeals committee finds that formal errors were committed and that this can reasonably be supposed to have affected the performance of one or more candidates or the assessment of that performance, the decision may be taken to carry out a new assessment or to hold a new examination or test.

#### § 5-3. *Complaints regarding marks awarded - right to explanation*

1. A student is entitled to an explanation of the marks awarded for his or her performance. At oral examinations or assessments of practical skills, a request for such an explanation must be made immediately on notification of the mark. Requests for explanations of other assessments must be submitted within one week after the candidate learns of the mark, but never more than three weeks after the announcement of the mark.
2. Explanations shall normally be given within two weeks after the candidate requests them. They shall state the general principles on which the assessment was based and explain the assessment of the candidate's performance. Explanations may be given orally or in writing at the examiner's discretion.
3. If written guidelines for assessments have been issued, they shall be available to students after the marks have been decided.
4. A student may appeal in writing against a mark awarded for his or her performance within three weeks of the announcement of the examination results. The performance shall then be reassessed. In the event of a request for an explanation of a mark or a complaint of procedural errors in the question-setting, the examination procedure or the assessment procedure, the time limit for appeals pursuant to this section is reckoned from the date when the student receives the explanation or when the appeal is finally ruled on. In connection with the use of



continuous assessment, the institution may decide whether the student shall submit an appeal following the assessment of a separate examination, assignment or other assessment or whether an appeal shall be submitted on announcement of the result of assessment of the study programme, discipline, or module.

5. Appeals may not be lodged against marks awarded for oral performance and assessment of practical training or the like which, owing to the nature of the test cannot be reviewed. The results of preliminary examinations (forprøver) may only be appealed against when the examination is failed.
6. Marks awarded following re-marking pursuant to this section may not be appealed against.

## INFORMATION ABOUT CHEATING AND ACADEMIC MISCONDUCT IN HOME EXAMINATIONS, SEMESTER ASSIGNMENTS AND OTHER EXAMINATIONS AT NTNU

On 12 October 2006, the Board of NTNU passed Guidelines concerning the action to be taken in cases of students cheating or attempting to cheat at examinations at NTNU. This extract from these Guidelines is written to give students important information about this matter. NTNU regards cheating as a serious matter with grave consequences when a student is even suspected of cheating. Failing to respect the work of others by not citing sources can lead to an examination being failed and even expulsion from NTNU and all higher education in Norway for up to one year.

NTNU defines cheating as actions that are in conflict with the examination regulations that lead to the results being more favourably judged than would otherwise be the case. This is a broad definition that includes gross negligence. The following examples clarify what NTNU can regard as cheating:

- An examination answer paper with all or some of the text from the Internet that is presented as the student's own work
- An examination answer paper with all or some of the text used by someone else at a previous examination
- An examination answer paper with all or some of the text used by the student at a previous examination
- An examination answer paper with all or some of the text written by someone else
- Work that is handed in as the student's own work that is written, designed or composed by someone else
- Quotes from textbooks, other sources, or the Internet that are not presented with their sources and are not clearly marked as quotations (plagiarism)
- Using examination support material that is not permitted

Ask your professors, Student Service or student advisers at NTNU if you are unsure about the rules relating to cheating. It is the student's own responsibility to find out about the rules relating to the use of other people's work - plagiarism - which is against Norwegian law (see below). In an examination, each student must find out what examination support material is permitted.

### Plagiarism detection

NTNU has acquired a system for plagiarism detection. This system is designed to detect plagiarism in examination answer papers submitted in connection with teaching at NTNU. This means that texts submitted by students in courses at NTNU can be checked for plagiarism.

### What Norwegian law says about cheating

The Act of 1 April 2005 relating to Universities and University Colleges Section 4-7, Subsection 1, b. states that the University Appeals Committee can annul an examination or test or approval of a course if the student has

*attempted to cheat or on purpose or with gross negligence has cheated in the course of or prior to the final assessment of the examination or test concerned, or while taking the course in question.*

**Annulment of the examination** (The above Law, Section 4-7, Subsection 1, b)

The least severe reaction is annulment of the examination. Annulment alone is used in the least serious cases of cheating. An attempt to cheat includes gross negligence. The matter is decided by the University Appeals Committee.

**Suspension from further studies** (The above Law, Section 4-8, Subsection 3)

In the graver cases of cheating the student may be excluded from NTNU and may lose the right to take examinations at other institutions covered by the Act relating to Universities and University Colleges for a period of one year. The matter is decided by the University Appeals Committee and requires two-thirds majority, see Act of 1 April 2005 relating to Universities and University Colleges Section 4-8, Subsection 4.

NTNU's Examination Regulations can be found on <http://www.ntnu.no/studier/reglement>. See [Examination Regulations at the Norwegian University of Science and Technology \(NTNU\)](#) (pdf).