
Møtereferat

Til stede: Turid Rustad, Trygve Brautaset, Per Bruheim, Finn Achmann, Berit L. Strand, Anita Nordeng Jakobsen, Eva Madland, Gudmund Skjåk-Bræk, Martin Gimmestad, Ingrid Bakke, Marit Sletmoen, Helga Ertesvåg, Rahmi Lale, Vetle Rem, Kjetil Rasmussen, Kurt Ingar Draget, Eivind Almaas, Kari Attramadal, Eva Falch, Eirin Skjøndal Bar, Jo Esten Hafsmo (referent)

Forfall: Iht innkalling

Kopi til:

Gjelder: Faglæremøte IBT

Møtetid: 05.10.17 kl 08:30 - 11:00 Møtested: K3.069

Signatur:

O-saker:

1. Finn Achmann informerer om opplegg for MN8000. Opplegget er kun revidert i mindre grad i forhold til tidligere.
2. Veiledning av bachelor- og masterstudenter – intern incentivordning, ref vedlagte pdf.
3. SFI-prosess – utlysning, ref vedlagte pdf.
4. Status strategi- og bemanningsplanarbeid: startegi: drøftet i utvidet ledergruppe, ikke sendt faggrupper ennå. Bemanningsplan: bemanningsplan for tekniske og vitenskapelige stillinger behandles i fakultetsstyremøte i desember
5. Flere søknader knyttet til innovativ undervisning er sendt inn, både til fakultetet og Norgesuniversitetet.
6. 2-årig master MS Marine Coastal Development (IV) gjøres om til MS Ocean Resources (NT); studieretninger planlagt som berører IBTer hhv. Industrial Biotechnology og Food Science. Saken var oppe i ledergruppen 02.10, IBT hadde møte med programrådsleder 03.10. Det er et ønske fra IBT om å differensiere navn på studieretning Industrial Biotechnology ift siv.ing. Innspill til navn sendes Kjetil snarest. Forslag om Marin Bioteknologi vurderes.

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Saksliste:**1. Evaluering av MBIOT5 og MSBIOTECH (Ansvarlig: Per)**

Per presenterer resultater og anbefalinger fra evalueringsrapporten, se vedlagte pdf.

Momenter fra diskusjonen:

- Store likheter mellom BBI og MBIOT5 tre første år, ønske om å styrke bioteknologi-identiteten i programmet
- Spørsmål stilt ved BI1006 og 1007 sin plass i programmet; er det behov for ett/begge?
- BI1001 har 7,5 studiepoengreduksjon mot TBT4170
- Mangler instrumentell analyse i programmet som sådan – dette bør vurderes.
- Mulig nytt biotek-emne i 5. semester ved flytting av ST0103; Bioteknologi og bioinformatikk; baseres på Rahmi sin modul i TBT4505 + case.
- Vurdere flere moduler i TBT4505 for å styrke bredde også innen MBIOT5/MSBIOTECH; Matvitenskap bør vurdere å tilby en modul innen Food Science.
- Gunstig å se til struktur for BSc-programmet i Ålesund ved omlegging.
- Vedr TBT4170; ikke gode lærebøker tilgjengelig for introemner, lettere å finne dette for studenter i tredje årskurs og senere. Undersøkelse blant MTKJ-studenter på TBT4170; ønske om mer dybde.
- Bioteknologi bør inn tidlig; enten som emne eller som andre aktiviteter.
- Bioinformatikk-emne; er det hensiktsmessig å plassere dette i 3. semester for å stimulere til valg mot Systembiologi.

Konklusjon: programrådet jobber med videre med evalueringen med tanke på å implementere prioriterte endringer. Innspillene fra møtet tas med i diskusjonen. Evt andre innspill sendes Per Bruheim.

2. PhD-emner (Ansvarlig: Berit)

I henhold til anbefaling i phd-evalueringssrapporten vil IBT nå ha en ny gjennomgang av våre phd-emner. Saken har vært diskutert i phd-programrådet og anbefalingen fra dette møtet er at vi setter et mål om max. ett phd-emne per faggruppe. Dette emnet skal gi breddekunnskap og være attraktivt for phd'er utenfor instituttet. I tillegg er det et mål om at våre emner tilbys gjennom en av landets forskerskoler. Ref vedlagte pdf.

Momenter fra diskusjonen:

- Det bør mer IP/entreprenørskap/outreach inn i PhD-studiet; en mulighet er å i større grad integrere dette i MN8000.
- Vi har relativt mange PhD-emner. Tallene viser at det over år har vært et lavt antall studenter på egne PhD-emner, derav undervisning annen hvert år.
- Det er en del samarbeid om PhD-emner, blant annet via Nordic 5 Tech.

- Med relativt få studenter bør PhD-porteføljen reduseres og man bør satse på bredere tematikk per PhD-emne. Ett foreliggende forslag er ett PhD-emne per faggruppe.
- Forskerskoler er knyttet til prosjekt fra Forskningsrådet; hva er skjebnen til kurset når prosjektet er ferdig? Fra Biostruct har man opplevd at interessen fra andre universitet faller selv om Forskerskolen videreføres som PhD-emne etter endt prosjekt.
- Forskerskoler; fokus på Scientific writing og presentasjonsteknikk. Ønsker at universitetene ivaretar dette.
- Problematisk med ulike emnestørrelse i forskerskoler og ved andre universiteter skaper problemer. Det etterlyses en noe mer liberal politikk mht (a) hvilke emner som kan inngå i PhD'en og (b) godskriving av enkelte aktiviteter som studiepoeng i PhD-graden, feks posterpresentasjon på konferanser

Presentasjon av forskerskoler/Digitalt Liv Eggset Falkenberg
Se vedlagte pdf.

Konklusjon: Det kommer en skriftlig bestilling til faggruppene på arbeidet med utvikling av PhD-emneporteføljen, -emner og deltakelse i forskerskoler.

EVT

Ingen saker til eventuelt.

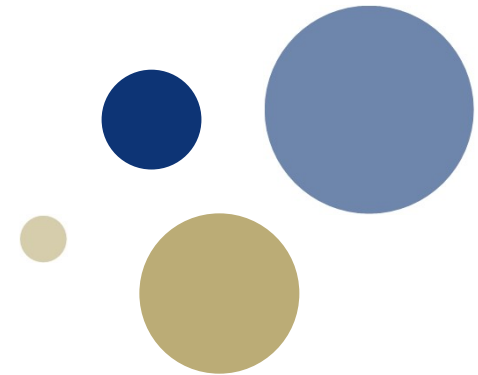
IBT-intern incentivordning for veiledning av master- og bacheloroppgaver

- Gjelder kun våre studieprogram hvor vi har egen emnekode (eks: IKKE master i biologi eller utvekslingsstudenter)
- Gjelder kun fast ansatte ved IBT – dvs det følger IKKE med penger til ekstern institusjon eller institutt
- Differensiering basert på intern/ekstern, teoretisk/eksperimentell, omfang \approx studiepoeng (SP)
- Midler kan brukes til det meste – inkludert reise og konferanseutgifter
- Opprettes internprosjekt for hver hovedveileder

Satser

Oppgave / omfang	beløp
Master 60 SP	30 000,-
Master 45 SP	30 000,-
Siv. Ing. 30 SP og 15 SP	15 000,-
Bacheloroppgave 3x20 SP	15 000,-

Unntak	
Teoretiske oppgaver	2/3 x aktuell sats
Samarbeid 50/50 med ekstern	½ x aktuell sats
Ekstern oppgave	3000,-

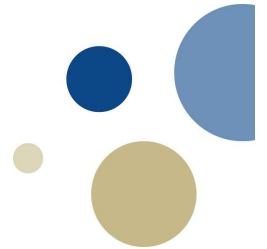


SFI-IV utlysning

Intern prosess

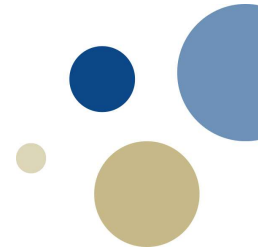
NV Ledermøte 26. september 2017

Kjennetegn ved SFI



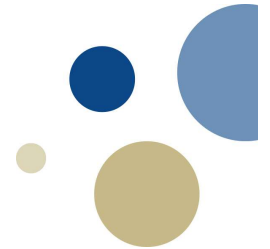
- rettet mot kunnskapsbehovene i næringslivet.
- en langsiktig investering i forskning som skal bygge opp sterke forskningsmiljøer.
- skal gi merverdi for de enheter som deltar, og gi ringvirkninger gjennom kompetanse og rekruttering av stor betydning langt utover sentrenes levetid.
- skal fremme samarbeidet mellom sterke forskningsmiljøer og FoU-aktive bedrifter.
- ordningen skal styrke teknologioverføring, internasjonalisering og forskerutdanning.
- det forutsettes samfinansiering mellom bedrifter, vertsinstitusjon og Forskningsrådet.
- bedrifter må delta aktivt i senterets styring, finansiering og forskning.
- sentrene vil bli etablert for en periode på maksimalt fem pluss tre år.
- vitenskapelig kvalitet i forskningen må ligge på høyt internasjonalt nivå.
- hovedkriteriet for å velge ut sentre er potensial for innovasjon og verdiskaping.

Om prosessen 1



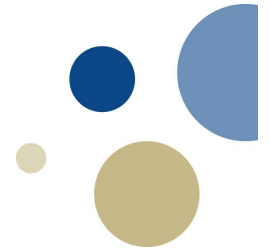
- SFI-utlysningen ventes å komme H2018/V2019.
- Hensikten med intern prosess er bl.a.:
 - Sikre en god, inkluderende prosess
 - Sikre lederforankring
 - Bidra til god søknadskvalitet
 - Tilby støtte til vanskelige tema (budsjett, roller, IP, etc.)
 - Avklare komplementære initiativ
- NTNU ved rektor er søker til SFI.
- Styringsgruppe (dekaner/prodekaner under ledelse av prorektor forskning) setter rammer og sørger for koordinering mellom fakultetene.

Om prosessen 2



- Anbefaler søkermiljøene å etablere kjerneteam som utvikler konsortium og skisse. Navngitt person som kontaktpunkt.
- Krav om tett dialog med linjeledelse når det kommer til spørsmål om ledelse/koordineringsansvar for SFI.
- Få oversikt internt ved NTNU først – deretter koordinering med SINTEF.
- I initiativ der NV har en sentral rolle, kalles kontaktperson inn til et møte med instituttleder og dekan/prodekan.

Konkret første steg:



- Søknads-initiativ må levere en beskrivelse med følgende hovedpunkter:
 - Søknadens tittel
 - Verts-institusjon
 - Potensielle partnere
 - Kjernegruppe NTNU
 - Faglig innretning/tematikk
 - Potensiale for innovasjon og verdiskapning
- Mal ettersendes
- Beskrivelsen sendes til Lars Onsøyen **senest 15. oktober.**

Søknadens tittel	Faglig innretning/tematikk	Potensiale for innovasjon og verdiskapning	Verts-institusjon (dersom NTNU, vis til fakultet)	Potensielle partnere	Kjernegruppe NTNU Grupper og individer. Kontaktperson i «bold».

Master's degree programme, 2 years, Trondheim

MSc in Ocean Resources (MSOCEAN)

Sustainable development of marine living resources

Kommentert [OV1]: Sjekk <http://www.campusdelmar.com/en/>
Interessant cluster som dekker like bredt som NTNU Oceans

About the Programme

The world's oceans have huge living resources which will become more and more important for humans, and which we will depend on for our further welfare. In order to use, protect and further develop these resources in a sustainable way, there is a need for dedicated and well-educated young people with broad and interdisciplinary knowledge about the interactions between marine biological resources and their use, the marine environment, marine technology, economy, and public concerns related to the marine sector. The MSc program **Ocean Resources** at NTNU aims to give the students a broad perspective beside their main in-depth specialization in marine science or marine engineering (see main domains in Figure 1). If you find it stimulating to take part and work with our further development of sustainable marine living resources, the MSc program **Ocean Resources** at NTNU is something you should consider.

The Master of Science programme in **Ocean Resources** is a two-year international multidisciplinary MSc-programme with five specializations (Figure 1). Both natural science and engineering departments are involved, and the programme is especially designed to give the students a broad understanding of the complex interactions in the marine sector. NTNU has excellent research communities within these fields and close contact with industry and relevant partners.

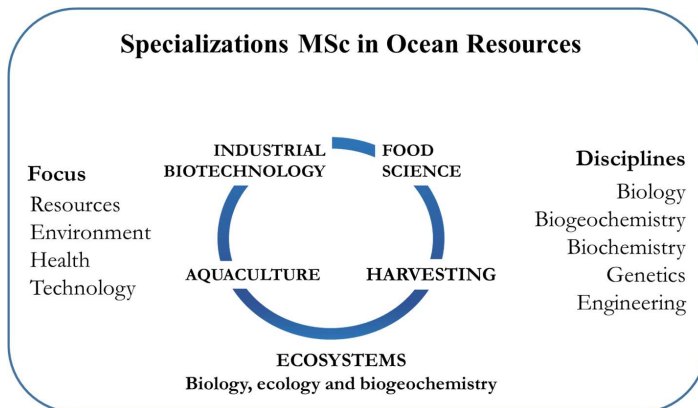


Figure 1. Main specializations of MSc Program Ocean resources with main focuses and key disciplines of the interdisciplinary studies. Other focuses and disciplines may also be relevant for the research domains.

MSC Ocean Resources has five specializations:

- Ecosystems – Biology, ecology and biogeochemistry
- Aquaculture
- Harvesting
- Industrial biotechnology
- Food science

Kommentert [OV2]: Why have industrial?

Kommentert [OV3]: Tilhenger av at det skilles ut. Gjør det lettere å ta med HIST-programmet i framtida. Jeg er i utgangspunktet positiv til det, og kan ha noe med kvalitet å gjøre også.

Specializations in MSOCEAN

Specialization *Ecosystems – Biology, ecology and biogeochemistry*

- Plankton biology and ecology
- Planktonic and benthic environment
- Chemistry and biogeochemistry
- Enabling technologies for marine research

Profiles within the specialization “Ecosystems – Biology, ecology and biogeochemistry” is mainly related to the biology, ecology and bio-geochemistry of planktonic and benthic ecosystems. The research and education activities includes functional ~~groups and interaction in planktonic groups~~ of bacteria, phytoplankton, micro-zooplankton and large meso-plankton, ~~and along with~~ key groups of macroalgae and animals in shallow and deep seas. Planktonic food webs and trophic interactions among functional groups and species in temperate plankton ecosystems has a main focus, but MSc projects may also involve arctic and tropical planktonic and benthic ecosystems. Other research activities have a focus on the use of plankton for industrial purposes.

Biology, ecology and bio-geochemistry of planktonic and benthic ecosystems forms the fundament of environmental studies, which among others involve environmental interaction of aquaculture, coastal eutrophication, environmental toxicology of the lower marine food chain, and biological processes of climate research in temperate and arctic oceans, including carbon export and sequestration.

New arenas of marine research are emerging through new technological methods for sampling and research. Establishment and use of new enabling sampling and research technologies has been a main focus in natural marine science research made by biologists and chemists in cooperation with marine NTNU-engineers. Such methods make new spectacular research possible, for example the use of ROVs or AUV’s as platforms for studies in extreme marine environments.

The students will obtain broad knowledge on aspects of the specialisation in master projects and in lectures given in the master programme.

Specialization *Aquaculture*

- Sea based aquaculture
- Recycling aquaculture and juvenile production
- Environment, welfare and health
- Aquaculture system design
- Enabling technologies for aquaculture

The specialization in Aquaculture involve several interacting domains. Sea based aquaculture and Recycling aquaculture and juvenile production are system oriented domains, while the remaining three are biological and technological oriented profiles representing key research focuses for the two aquaculture systems (Figure 2). Students will get broad knowledge on the systems and the relevant research focuses in master projects and in lectures given in the master programme.

Kommentert [OV4]: This is also biotechnology!!
It is also to a large extent technological oriented

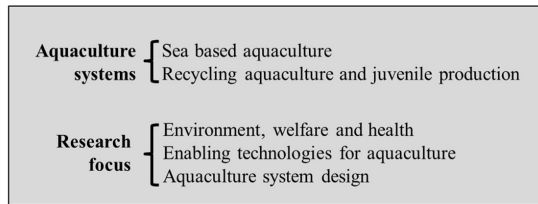


Figure 2. Main research domains in the aquaculture specialization of MSc Ocean Resources. System oriented and biological and technological oriented profiles representing key research focuses for the two aquaculture systems.

Sea based aquaculture research involves both biological and technological aspects on salmon and seaweed farming, as well as other more minor activities. Seaweed research involves both biological aspects of farming and biotechnological aspects of the use of seaweed, and technological challenges of seaweed farming is an upcoming aspect. The salmon industry undergoes a change towards expansion of production to more exposed locations, which implies increase in scale, farming technology, environmental interactions, and challenges in fish health and welfare.

Salmon lice is currently regarded to be a major problem for salmon producers and society, and lice biology, ecology and genetics along with production of juvenile cleaner fish for mitigation of the salmon lice problem in the salmon industry are among the main focuses of MSc projects. Other research fields are live feed production, fish larval morphology and development, genomics of juvenile fish, and lipid metabolism and first feeding using live zooplankton.

The use of water recycling technology for “recycling aquaculture systems” (RAS) has recently become the main production system for juvenile salmon and marine species. The interdisciplinary research community at NTNU covers technological challenges of RAS along with advanced microbial and biological issues of water treatment and cultured fish.

In the specialization Aquaculture, MSc students of all disciplines have the option of undertaking their MSc project in cooperation with a world leading salmon aquaculture industry.

Specialization *Harvesting*

- Environmental interactions
- Fishing fleets and vessels
- Fishing gear and enabling technologies

A main focus of the specialization Harvesting is establishment of knowledge to understand how vessels and technology in the fishing fleet can contribute to sustainable harvesting of ocean resources. These activities have three main pillars. First environmental interactions of harvesting and harvested ocean resources, then design and operation of fishing fleets and fishing vessels, and finally fishing gear and enabling technologies. Fish resources has an important focus, but harvesting of low-food chain resources such as copepods and technology to harvest farmed seaweed are other important aspects.

The students will get knowledge in processing technologies of marine resources, design of systems of fishing vessels, fishing gear and enabling technologies, and analysis of catching capacities of fishing fleets in light of current technologies. This includes knowledge about the

framework conditions and environmental challenges for commercial fisheries in a value chain perspective, as well as methods for assessing environmental interactions and life-cycle impact.

Specialization *Industrial biotechnology*

- Microbial production processes
- Feed resources
- Microbial management in RAS
- Seaweed resources

The specialization Industrial Biotechnology has a main focus on the sustainable production of limiting feed resources for aquaculture based on microalgae and other microbes. The availability of marine lipid resources is a potential show-stopper for the fast developing aquaculture industry worldwide. There is an urgent need for new sources of long-chain n-3 fatty acids (marine type), but later also for proteins and other feed ingredients. Planktonic copepods, krill and seaweed represents possible resources, but a main focus of the research community is currently on large scale production of suitable microorganisms in biotechnological systems. Thraustochytrids, microalgae and heterotrophic bacteria ~~and~~ are among the interesting groups of microorganisms. The research has microbial, genetic, and physiological aspects along with the challenges to establish production systems and technology. A second focus is to develop proteins and other ingredients for fish feed from seaweeds, mainly from laminaria species.

In the specialization Industrial biotechnology, MSc students have the option of undertaking their MSc project in a new field of research in an upcoming industry of marine industrial biotechnology. Students will get broad knowledge on the key research issues in master projects and in lectures given in the master programme.

Specialization Food science

- Aquatic food production
- Fish waste utilization
- Seaweed processing

Most of the fish resources are already fully exploited, or overexploited, and there is a need for better preservation and processing methods to reduce loss and increase the volume used for human consumption. More knowledge on the biochemistry and quality of the raw material and the relationship between raw material and processing parameters is needed. The focus of the research will be on maintaining the healthy components in seafood, the food safety and the quality. There is also an increasing interest in fresh food and minimally processed food. Harvesting and processing of other resources such as plankton, krill and seaweed is also important. These resources require new preservation and processing methods.

The Food science specialization include Aquatic food production, which is the former Nordic master program MSAQFOOD. This program is now merged into MSOCEAN and forms a major component of the specialization Food science. Aquatic food production has special application routines (www.ntnu.edu/studies/msaqfood).

Strategic basis and participating departments of MSc Ocean Resources

NTNU OCEANS - Ocean research is one out of four long term Strategic Research Area in NTNU (2014-2023) (ntnu.edu/oceans) and MSc Ocean Resources involves activities in several research areas of NTNU OCEANS (ntnu.edu/oceans/research-areas).

NTNU Biotechnology (ntnu.edu/biotechnology) is a cross faculty research area to support enabling biotechnology in important research areas. Marine research and education are important and NTNU Biotechnology is relevant for education in MSc Programme Ocean Resources.

The following Faculties and Departments at NTNU in involved in the cross-faculty MSc programme Ocean Resources:

Faculty of Natural Sciences (NV). Responsible faculty (ntnu.edu/nv)
Department of Biology (IBI). Responsible department (ntnu.edu/biology)
Department of Biotechnology and Food Science (ntnu.edu/ibt)
Department of Chemistry (ntnu.edu/chemistry)

Faculty of Engineering (IV) (ntnu.edu/iv)
Department of Marine Technology (ntnu.edu/imt)
Department of Civil and Environmental Engineering (ntnu.edu/ibm)

Principle advisers and contacts

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Contact Civil and Environmental Engineering:

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Evaluation of the 2-year Master's programme in Biotechnology (MSBIOTECH) and 5-year Master's programme in Biotechnology (MBIOT5) at NTNU Trondheim



Oppfølgingspunkter:

1. Frafall
2. Oppdatere læringsmål, også læringsutbytte (jfr NOKUT 2015)
3. Bioteknologi må inn tidligere (????)
4. Bioinformatikk må innføres som obligatorisk for alle
5. Kast ut perifere emner
6. Tettere samarbeid med biotek-industri
7. Smalere inngang til MSBIOTECH
8. Klassefølelse, seminar, ekskursjoner

Oppfølgingspunkter:

9.

MBIOT5: «*There is a strong emphasis on experimental skills which is based on the impressive resources available to students. However, there are little, if any, training in independent experimental problem-solving during the first 3 years.*»

MBIOT5 med fordypning Molekylærbiologi

Semester 1

ExPH0004	Exphil Naturvitenskap og teknologi
KJ1000	Generell kjemi 15SP
MA0001	Brukerkurs i matematikk A eller
MA1101	Grunnkurs i analyse I

Semester 2

BI1001	Celle-og molekylærbiologi 15 sp
KJ1020	Organisk kjemi 15 SP

Semester 3

BI1006	Dyrenes struktur og funksjon
BI1007	Plantenes struktur og funksjon
TBT4102	Biokjemi 1
TDT4105	Informasjonsteknologi, gr.kurs

Semester 4

TBT4107	Biokjemi 2
TBT4140	Mikrobiologi
MA0002	Brukerkurs i matematikk eller
MA1102	Grunnkurs i analyse II + Perspektivemne

Semester 5

BI2014	Molekylærbiologi
BI2015	Molekylærbiologi, lab kurs
ST0103	Brukerkurs i statistikk + 1 valgbart

Semester 6

BI2012	Cellebiologi
ST2304	Statistikk modellering for biologer/ bioteknologer
+ 2 valgbare	

Obligatorisk for alle 3 studieretninger (Biokjemi og biopolymerkjemi, Systembiologi, Molekylærbiologi)

BSc Biologi med fordypning Celle og molekylærbiologi

Semester 1

KJ1000	Generell kjemi 15 SP
BI1003	Evolusjonsbiologi, økologi og etologi 15 SP

Semester 2

BI1001	Celle- og molekylærbiologi 15 SP
BI1002	Faunistikk og floristikk 15 SP

Semester 3

BI1006	Dyrenes struktur og funksjon
BI1007	Plantenes struktur og funksjon
MA0001	Brukerkurs i matematikk A
ExPH0004	Exphil Naturvitenskap og teknologi

Semester 4 (alle valgbare?)

BI2024	Menneskets anatomi og fysiologi
BI2033	Populasjonsøkologi
KJ1020	Organisk kjemi 15 SP
TBI4110	Økotoksikologi og miljøressurser
TBT4110	Mikrobiologi

Semester 5

BI2014	Molekylærbiologi
BI2015	Molekylærbiologi, lab kurs
ST0103	Brukerkurs i statistikk + 1 valgbart bla TBT4102 Biokjemi 1 anbefalt

Semester 6

BI2012	Cellebiologi
ST2304	Statistikk modellering for biologer/ bioteknologer
+ 2 valgbare bla TBT4107 Biokjemi 2 anbefalt	

BSc Bioteknologi IBA

Semester 1

MK102108	Generell kjemi 10 SP
BR100209	Matematikk og statistikk for kjemi og biologi
MB101812	Generell mikrobiologi 10 SP

Semester 2

MK101309	Organisk kjemi og biokjemi 15SP
BI101814	Anatomi og fysiologi
MB102314	Mikrobiell økologi

Semester 3

BI200115	Celle- og molekylærbiologi 10 SP
MK201212	Ernæring 10 SP
MB322012	Anvendt bioinformatikk 5 SP
BI2011109	Instrumentell analyse del 1 av 2

Semester 4 (alle valgbare?)

BI201109	Instrumentell analyse del 2 15 SP
MB201712	Grunnleggende bioteknologi 10 SP
MBI221412	Immunologi 5 SP
MK211712	Marine lipider 1 5 SP

Semester 5

BI322112	Etikk i bioteknologi 5 SP
MB301712	Anvendt bioteknologi 15 SP
MK301915	Prosessteknologi

Semester 6

MN304012	Kvalitetssikring og sertifisering
MS301612	BSc oppgave 22,5 SP

PhD evaluation, NV faculty 2017

Tasks for PhD program councils

- Revise and strengthen the course portfolio with the aim to broaden the perspectives and understanding and increase international (national) collaboration
- Ensure internationalization of the PhD education including courses and longer research stay abroad
- Introduce mandatory half way evaluation / PhD hearing

PhD coursework/academic training

- The required coursework or other academic training must be equivalent to at least 30 credits
- At least 20 credits are to be taken in established PhD level courses.
- Obligatory course at NV faculty (PhD level):
 - MN8000: Doing science: Methods, Ethics and Dissemination (7.5 credits)
 - Mandatory seminars in outreach/popular dissemination as well as IP handling and entrepreneurship/for all PhD candidates will be established at the NV-faculty
- General trend that IBT PhD students take courses outside NTNU (research schools, training schools)

PhD courses at IBT 2017/2018

[BT8101: Mikrobiell økologi](#) - Undervises ikke 2017/2018

[BT8105: Prokaryot molekylærbiologi](#) - *utgår!*

[BT8113: Biomaterialer](#) - **5 phd-studenter**. (På egn står det at det ikke undervises høst 2017, men på beskrivelsen holdes det høst 2017)

[BT8114: Marin biokjemi](#) - Undervises ikke studieåret 2017/2018

[BT8115: Proteinstrukturer](#) - **3 phd-studenter**, 2 master (vår)

[BT8116: Eksperimentelle metoder i biopolymerkjemi og glykobiologi](#) - **1 phd-student** (vår)

[BT8117: Marine lipider](#) - **5 eksterne/utvekslingsstudenter** (vår)

[BT8118: Systembiologi modellering av cellulær metabolisme](#) - Undervises ikke studieåret 2017/2018

[BT8119: Videregående næringsmiddelkjemi](#) - **1 masterstudent** (høst)

[BT8120: Prokaryot molekylærbiologi og syntetisk biologi](#) - Undervises ikke studieåret 2017/2018

[BT8135: Biopolymerer videregående kurs](#) - **3 phd-studenter** (høst)

PhD Courses offered by the Dept. of Biotechnology

Candidates per PhD course per year

	2011	2012	2013	2014	2015	Total 2011-2015
BT8101	10			0		19
BT8103	5	4	2			11
BT8105	5		0		4	15
BT8112			2	3		5
BT8113	1	5				6
BT8114	8		1		7	16
BT8115	3		3		4	10
BT8116		4	2			6
BT8117			8		7	15
BT8118		1			1	2
BT8119	3	0	3	2	2	19
BT8135		1	5		0	6

PhD portfolio – future

- Reduce number of courses given at IBT (one per “faggrupe”)
- Broaden the topic of the courses that are given
- The courses should be attractive to candidates outside IBT:
 - Recruitment from other departments/faculties at NTNU?
 - Recruitment from other universities?
 - Being a part of a Research School/international training network?

Coursework

Admission and financing

Regulations

Upcoming doctoral defences

Dr.philos.

Doctoral Awards Ceremony

DOCTORAL EDUCATION (PHD)

Coursework

NTNU offers a range of [courses at the doctoral level](#). In addition to the doctoral thesis, a PhD education consists of a coursework component of at least 30 ECTS. Most PhD-programmes have a combination of compulsory and elective courses. As part of your application process, you must develop a plan for your coursework component. For more information on which courses are available for you, look at the web pages of the specific PhD-programme.

Doctoral courses through Nordic universities

Nordic Five Tech (N5T) is an exclusive, strategic alliance of the five leading technical universities in Denmark, Finland, Norway and Sweden. As a PhD-candidate at one of these universities, you may attend [PhD-courses at all five universities](#) at no extra cost.

External candidates

If you are not a PhD-candidate at NTNU, you may still [apply for and attend PhD-courses here](#).

Graduate researcher schools

<https://www.ntnu.no/phd/external>

PhD courses at Nordic Five Tech

Type search word, to look up matching courses



[Show advanced search options](#)

Nordic Five Tech (N5T) is an exclusive, strategic alliance of the five leading technical universities in Denmark, Finland, Norway and Sweden.

A number of joint projects have been launched to support the vision of N5T as an extended campus. One of them is this joint PhD course database. The aim of this initiative is to increase mobility for our PhD students within the five universities and further strengthen the alliance by encouraging more research cooperation.

If you are a PhD student at one of the five N5T universities you do not have to pay for participating in courses registered in this database. Please note that the database also includes nontechnical PhD courses.

[SHARE](#) ...

Upcoming courses

- [Perspectives on Research through Art and Design Practices](#)
- [Visual Communication Design Doctoral Seminar](#)
- [Applications of MRI P](#)
- [Engineering Design Exercises L](#)
- [Vehicle Mechatronics L](#)

Look here for more information on registration

[Aalto University](#)

[Chalmers University of Technology](#)

[Technical University of Denmark \(DTU\)](#)

[Royal Institute of Technology \(KTH\)](#)

[Norwegian University of Science and Technology \(NTNU\)](#)

Graduate researcher schools

A graduate researcher school consists of a network of universities, university colleges and research institutes and **complements** the regular PhD-programmes. By participating in a graduate researcher school you gain access to a larger research group, a greater variety of PhD-courses, joint seminars and so on. Once you have been admitted to a PhD-programme, you may join a graduate researcher school in your field of study.

Graduate researcher schools for PhD-candidates at NTNU:

- [Authoritative Texts and Their Reception – ATTR](#)
- [Centre for Digital Life Norway Research School – DLNRS](#)
- [Enterprise Development and Work-life Research](#)
- [National Graduate School in Teacher Education – NAFOL](#)
- [National Research School in General Practice – NAFALM](#)
- [National Graduate School in Educational Research – NATED](#)
- [National Graduate School in Structural Biology](#)
- [National interdisciplinary Research School Religion-Values-Society](#)

And many more –
see:
<https://www.ntnu.no/phd/emner>



RESEARCH & INNOVATION

Marie Skłodowska-Curie Actions

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Innovative Training Networks (ITN)

Are you looking for high quality doctoral-level training in and outside academia?

Innovative training networks bring together universities, research centres and companies from different countries worldwide to train a new generation of researchers.

The funding boosts scientific excellence and business innovation, and enhances researchers' career prospects through developing their skills in entrepreneurship, creativity and innovation.

PhD portfolio - future

- Reduce number of courses given at IBT (one per “faggrupe”)
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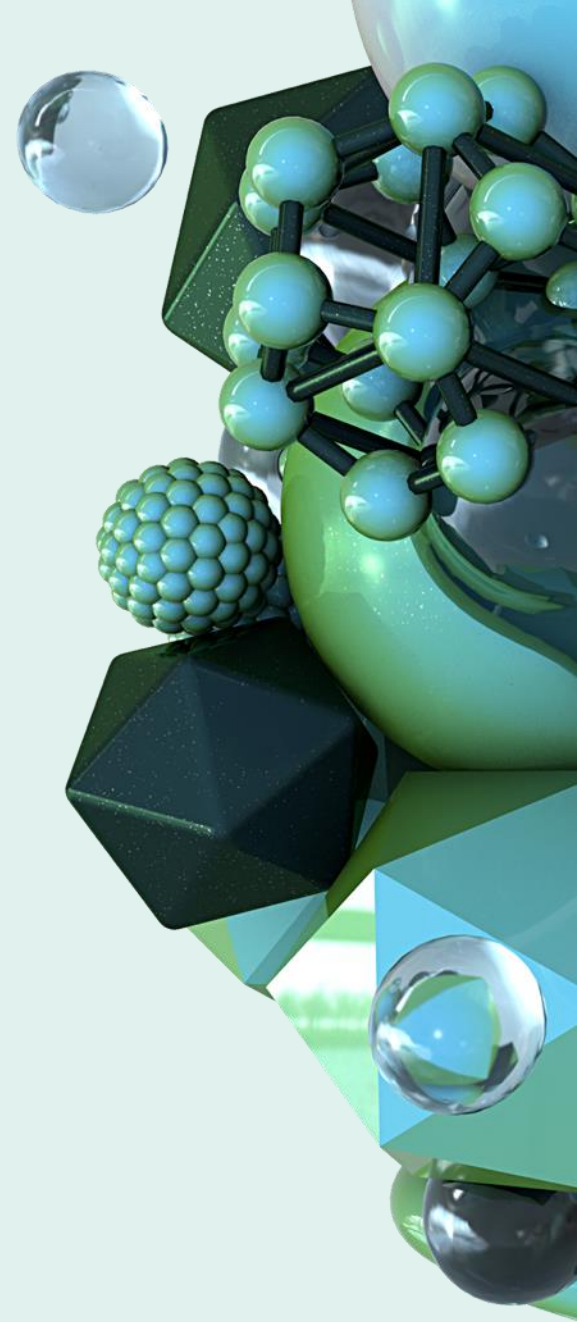
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NORWAY**

Norwegian Research Schools and Digital Life Norway Research School

Liv Eggset Falkenberg

Coordinator, Digital Life Norway Research School

05.10.2017



National Research Schools – why?



- Established with funding from the Research Council
- A **collaboration** among universities in Norway to coordinate and improve the PhD education in specific fields.
- A **supplement** to the universities' own PhD programs; membership is optional
- Goal for the national PhD education: Better – more relevant – available to all

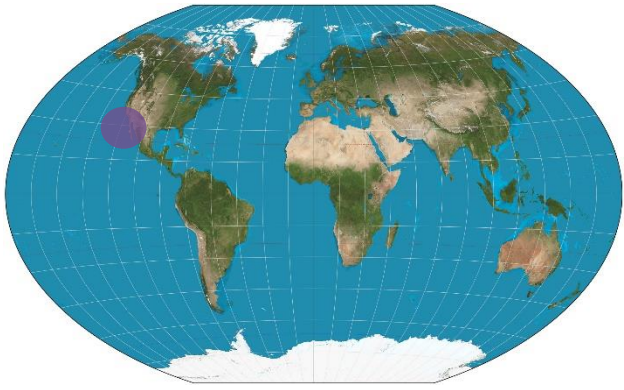
COURSES – WORKSHOPS – CONFERENCES – GRANTS – NETWORKING

Research schools relevant for biotechnology

- Digital Life Norway Research School
- National research school in bioinformatics, biostatistics and systems biology (NORBIS)
- National graduate school in biocatalysis (BioCat)
- Research School in Biosystematics (ForBio)
- Simula (Strong focus on modelling and machine learning)
- The National Graduate School in Infection Biology and Antimicrobials (IBA)
- Norwegian PhD School of Pharmacy (NFIF)
- Norwegian Research School in Neuroscience (NRSN)



- Part of Centre for Digital Life Norway
- PhD students and postdocs
- Offers:
 - PhD courses (pre-selected portfolio through open calls in 2016 and 2017)
 - Annual conference
 - Generic courses
 - Travel grants to attend courses
 - Support for PhD courses:
 - Financial:
 - Invitation of external/international speakers
 - Administrative purposes: Development of new courses, re-invention of old courses, implementation of new/innovative learning methods
 - Administrative: Help from the coordinator (organization, approval, etc)



San Diego

- Simula Summer School in Computational Physiology (combined w/ Oslo)

Bergen

- Modelling living systems - From foundational problems to applications
- Hands-on data management: SEEK and NeLS platforms
- Network Biology/Integromics Bioinformatics - Applications towards Medicine
- Methodologies for Digital Life - Focus on Metabolic Systems
- Scientific writing course 2018?

Kristineberg, Sweden

- International PhD School:
Fish toxicology in silico – Toxicogenomics, Bioinformatics, and Mathematical Modeling

Tromsø

- Optical Nanoscopy
- Correlative Light and Electron Microscopy
- Tromsø PET Seminar 2017
- Preclinical PET and Complementary Methods in Small Animal Molecular Imaging

Trondheim

- Metabolomics: Methods and Applications
- Metabolic Pathway Analysis
- Molecular and Synthetic Biology
- Logical Modeling for Experimental Design in Current and Future Biotechnology and Biomedicine

Åre

- Supervisor workshop 2017

Oslo

- Scientific Writing Course 2017
- Responsible Research and Innovation Summer School
- ComPh Modelling Week
- Simula Summer School in Computational Physiology (combined w/ San Diego)

Ås

- Computational Neuroscience





NORBIS

National research school in bioinformatics, biostatistics and systems biology

- Large genetic studies in biobanks: from registries screening, to interpretation of GWAS and beyond
- Metabolic pathway analysis
- Modern methods for analysing survival and time-to-event data
- Statistical methods in relatedness and pedigree analysis,
- Sequence comparison and database search (NORBIS901),
- High Performance Computing in Bioinformatics (INF9380),
- Genetic epidemiology and genome-wide association analyses (GENESTAT),



- **Mining for new enzyme activities.** In silico and functional screening for enzyme activities.
- **Enzyme production technologies.** Protein production (cloning, expression, and purification)
- **Structure determination overview.** X-ray crystallography, NMR, EPR, AFM, homology modelling etc
- **Enzyme kinetics.** Reaction kinetics, inhibition – including stopped-flow techniques
- **Enzyme mechanisms.** Chemical reactivity and principles, mechanistic classification, selectivity
- **Applied biocatalysis and biorefining.** Industrial applications to material processing, synthesis, diagnostics, etc
- **Biomolecular structure and function.** Principles of structural Chemistry. 3D structures of proteins, DNA/RNA and carbohydrates. Introduction to experimental methods for structure determination and structure prediction.
- **Molecular modelling of enzymatic catalysis.** The course will present central methods in molecular modelling for the analysis of enzyme structure-function relationship and the modeling of their catalytic activity.
- **Synthetic biology and biocatalysis.** Microbes as production tools, design of microorganisms for industrial purposes.
- **Protein redox chemistry.** Redox active enzymes, redox cofactors, transition metal ions, electron transfer, etc.
- **NMR.** Structure determination, ligand interactions, and functional aspects using NMR.



NFIF
NORWEGIAN PHD
SCHOOL OF PHARMACY



IBA

simula
education



NRSN

Norwegian Research School in Neuroscience



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Typical course outline in research schools

- Short duration: Max 2 weeks of obligatory attendance
- Available to travelling students
- 5-10 ECTS
 - Generic courses: 2-5 ECTS
- Usually an essay/oppgave at the end

Advantages:

- Reach more relevant students
- Networking between students – stronger scientific community

Signature course

Goals:

- genuine transdisciplinary collaboration, particularly between biology/medicine on one side and mathematics/informatics/engineering /physics on the other side
- collaborations in teaching and research between Norwegian research institutions

Course structure:

- Transdisciplinary group work
- The group work is organized and supervised by senior researchers ("prosjektansvarlig") at the different research institutions
- The course is organized by a single individual ("fagansvarlig") and the course is registered at the home university of this individual
- Course plan: see handout

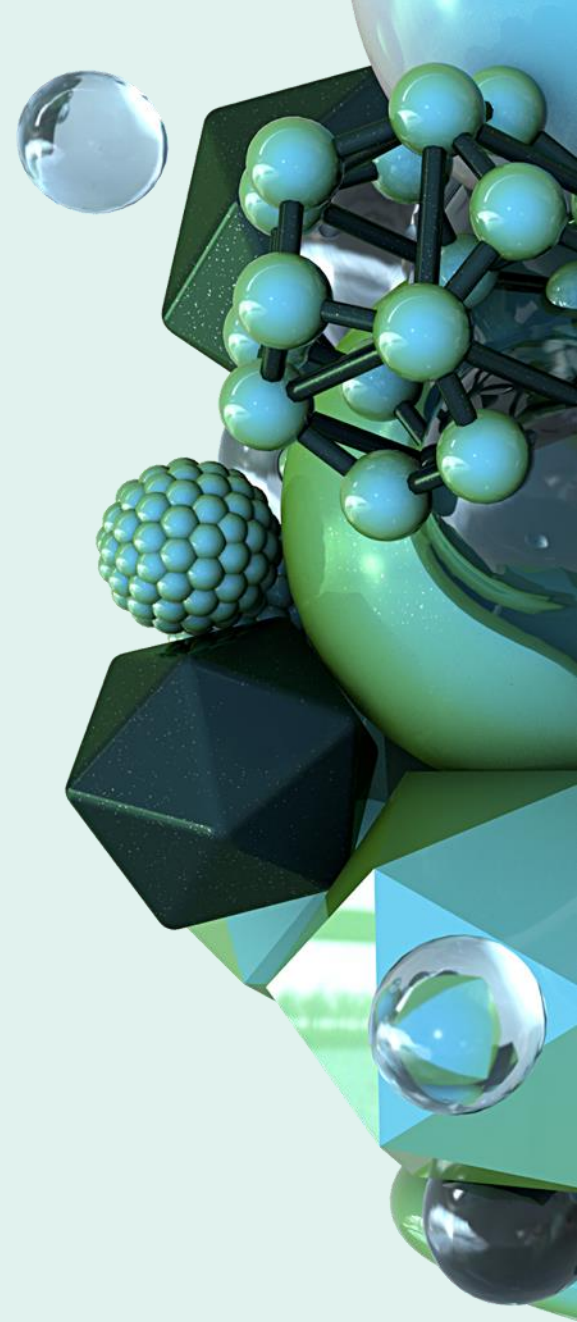


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www.digitallifenorway.org/dlnrs

liv.falkenberg@ntnu.no

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Home

The National graduate school in biocatalysis– BioCat, is granted by The Norwegian Research Council for the period 2016 – 2024, and established to provide expertise and tools for research and research education within biocatalysis in Norway.

The school is open to all PhD-students and their research groups within the field. Biocatalysis is important in many areas including biomedicine, biotechnology, microbiology, and (bio)nanoscience. Additionally, biocatalysis is becoming increasingly important industrial processes and in various diagnostics-, gene- and biotechnologies, and is expected to be important in the transition of the society to a bio-based economy.

The aim of initiating graduate schools in Norway is to unite small scientific communities and increase collaboration between research groups, create student platforms for technical and academic exchange and training, and thereby improve the quality and the skills of the PhD students. BioCat will in particular emphasise aiding career development of early stage researchers, both PhD and Post Doc fellows, in the field.



<https://site.uit.no/biocat/>

PLEASE SIGN TODAY OR TODAY!



C5 BioCat – Enzyme Mechanisms

C9 BioCat – Synthetic biology and biocatalysis



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C5 BioCat – Enzyme Mechanisms 2017

Key information

Dates: 24.04 – 28.04.2017

Place: UiT – the Arctic University of Norway, Tromsø

Course responsible: Dr. Kathrin H. Hopmann, UiT

Exam: 08.06.2017

Credits: 4 ECTS (Recommended – see note below)

Note: *The course is sought approved through the official system at UiT, but the approval process will take some time and for the first year the course will not have an official code. BioCat will provide the students with diploma and documentation for the content and extent of the course, so that you can apply to your own institution for ECTS.*

Registration: Deadline **01.03.2017**, register to biocat@uit.no



<https://site.uit.no/biocat/>

PLEASE SIGN TODAY OR TODAY!