Description of the PhD Programme in Biotechnology

Description of the PhD Programme

Introduction:

The Department of Biotechnology is responsible for the major research area biotechnology. Research is carried out in cooperation between departmental and external research groups. Both basic and applied research topics are addressed.

The Department of Biotechnology offers 13 courses on PhD-level.

There are currently 25-30 PhD-students admitted to this program.

Learning objectives:

The PhD program in Biotechnology aims to have a high international level. The program will give the candidates experience in relevant experimental research methods and a scientific understanding of central areas within Biotechnology.

Subject areas:

PhD studies is presently carried out within a range of fields within the research area of the department:

Biopolymer chemistry and bio-nanotechnology

- Genetics
- Determination of polysaccharide primary structure
- Enzymatic, chemical and physical modification of polysaccharides
- Determination of conformation in solution and gel phase
- Interactions between polysaccharides and ions, enzymes, antigens, DNA and RNA
- Non-viral gene delivery using chitosans
- Nanostructure, phase behaviour and rheology in biopolymer gels, films, emulsions and suspensions
- Alginate based capsule technology for treatment of diabetes
- New experimental methods for characterization of polysaccharides
- New biomedical and pharmaceutical applications of alginates, chitosans, gelatine, sphagnan, beta glucans, glycoproteins and proteoglycans
- Capsule- and gel technology applied in food

Marine biochemistry / mariculture

- Production of fatty acids (DHA) in marine microorganisms
- Marine biopolymers – from raw material to biological applications
- Fish gelatins: Properties and modifications
- New antibiotics from marine bacteria
- Capsule- and gel technology in feed technology

Molecular genetics / Microbiology

- Studies of the mechanism for plasmid replication, construction of cloning vectors and analysis of recombinant protein expression

- Genetic analysis of the production of antibiotics in bacteria
- Studies of molecular mechanisms for cellular osmoregulation
- The genetics of alginate biosynthesis and function studies of the enzyme structures
- Oil microbiology
- Development of new plasmid tools for use in bioprospecting
- Microbial producers of bioactive agents from the marine environment

Biochemical engineering

- Production of secondary metabolites in bacteria
- Microbiological aspects in food science
- Microbial production of lysine from methanol

Food chemistry:

- Superchilling of food
- Utilization of red feed (Calanus)
- Studies of water and salt in fish and meat by NMR
- Using NMR for authenticity testing of foods
- Lipid oxidation
- Ethical slaughtering of white fish
- Production of stable marine oils

Environmental biotechnology / Microbial ecology

- Biofilm formation and biofouling
- Gel-immobilized microbial ecosystems
- Anaerobic fermentation of organic material
- Directing microbial environment in marine aquaculture
- Mechanisms for bacterial colonization and directing microbial environment in marine aquaculture
- Structure and stability in natural pelagic ecosystems

§ 5 & 7.3 Admission

For admission to the PhD programme a broad academic background within the discipline (and other relevant disciplines) is required. The applicant's academic background will be considered individually. Applicants must have a master's degree with an average grade of B or better and a bachelor's degree with an average grade of C or better.

§ 5.2 Project description

No specific reqirements beyond section 5.2 in the PhD Regulations

§ 5.2 Funding

A source of finance must be documented before admission will be granted.

§ 5.2 Supervision
No specific reqirements beyond section 5.2 og 8 in the PhD Regulations

§ 7.2 Residency Requirements
No specific reqirements beyond section 7.2 (and 2, 4 and 5.2) in the PhD Regulations

§ 4 & 5.2 Participation in active research groups in Norway and Internationally
No specific reqirements beyond section 4 and 5.2 in the PhD Regulations

§ 2, 4 & 5.2 Scientific and academic dissemination
No specific reqirements beyond section 2, 4 and 5.2 in the PhD Regulations

§ 9 Reporting
No specific reqirements beyond section 9 in the PhD Regulations

§ 7.3 Organized academic training
At least one of the courses from the table below must be included in the academic training plan for PhD

PhD courses at the Department of Biotechnology:

Course ID	Course	Semester	Credits
BT8101	Mikrobiell økologi *Microbial Ecology*	H11	9,0
BT8104	NMR i fysikalsk biokjemi og biologi *NMR in Physical Biochemistry and Biology*	V11	9,0
BT8105	Prokaryot molekylærbiologi *Prokaryote Molecular Biology*	V11	7,5
BT8106	Glykobiologi - Komplekse karbohydrater *Glycobiology - Complex Carbohydrates, Structure and Biological Functions*	H11	7,5
BT8112	Salting av Fisk *Fish Salting*	H11	5,0
BT8113	Biomaterialer *Biomaterials*	H10	7,5
BT8114	Marin biokjemi *Marine Biochemistry*	V11	7,5
BT8115	Proteinstrukturer *Protein Structures*	V11	7,5
BT8116	Eksperimentelle metoder i biopolymerkjemi og glykobiologi *Experimental Methods in Biopolymer Chemistry and Glycobiology*	V12	7,5
BT8117	Marine lipider *Marine Lipids*	V11	7,5
BT8118	Avanserte Emner i sytembiologi *Advanced topics in Systems Biology*	H10	7,5
BT8119	Videregående næringsmiddelkjemi *Food Science, Advanced*	H10	9,0

PhD/ master courses at the Department of Biotechnology:

Course ID	Course	Semester	Credits
BT8103	Molekylær toksikologi Molecular Mechanisms of Toxicology	H10	7,5

Recommended Courses:

Course ID	Course
AK8000	Fiskens utviklingsbiologi *Early Life History of Fish* (Can be included in the 20 of 30 credits required on PhD level)
FI3107	Bioteknologi og etikk *Biotechnology and Ethics* (Cannot be included in the 20 of 30 credits required on PhD level)
KJ8100	Organisk, medisinsk og farmasøytisk kjemi *Organic Medicinal and Pharmaceutical Chemistry* (Can be included in the 20 of 30 credits required on PhD level)
KJ8901	Enzymkjemi *Enzyme Chemistry* (Can be included in the 20 of 30 credits required on PhD level)
FY8403	Biopolymergeler og nettverk *Biopolymer Gels and Networks* (Can be included in the 20 of 30 credits required on PhD level)