PROGRAMBESKRIVELSE / SØKNAD OM GODKJENNING AV FORSKERSKOLE
DET MEDISINSK-ODONTOLOGISKE FAKULTET

(Sendes fakultetet i Ephorte via ansvarlig institutt)

Del 1: Forskerskolens tilhørighet

Forskerskolens navn:	Bergen Biomedical Research School
Forskerskolen skal tilknyttes (institutt):	Department of biomedicine
Forskerskoleleder:	Marion Kusche-Gullberg
Navn på administrativ kontaktperson:	Anne Berit Apold
Forventet antall kandidater i forskerskolen (kapasitet):	75-80 internal + 20-25 external candidates
Forventet antall veiledere som knyttes til forskerskolen:	32

The Bergen Biomedical Research School (BBRS) is the Research School of the Department of Biomedicine at the Faculty of Medicine and Dentistry (MOF), University of Bergen. The school is collectively supported by the individual Research Groups and the National Technology Platforms of Department of Biomedicine. The central tenet of BBRS is to provide a broad and excellent platform for PhD education in the area of basic and translational biomedical science that will supplement the research education offered by MOF. The courses offered reflect a diversity that is reflected in the Department of Biomedicine and cover basic and translational areas of research including cell and developmental biology, biochemistry, nanotechnology, circulation research, tumor biology and neuroscience. A strong focus of BBRS is the array of scientific techniques and approaches utilized by the staff, including biophysics and computational structural biology, molecular biology, biochemistry, cell biology and physiology and imaging. As part of the larger organized program of doctoral education of MOF, BBRS provides a comprehensive research education for PhD students. Additionally, BBRS cooperates with other research schools at the local, national and international level, with which the faculty of the Department is already involved.

Del 2: Faglige forhold

The main objectives of BBRS are to:

1) Offer PhD students research opportunities in areas covering basic, translational and clinically related biomedical science.

2) Provide an attractive, stimulating and international environment for PhD students.

3) Establish an effective network for PhD students and alumni of BBRS that will serve to promote interactions and collaborations beyond the PhD-research period.

The department's research groups form the foundation of BBRS, providing a comprehensive training environment, solid research direction and, through the national and international collaborations of the faculty, an expansive network of scientific opportunity for PhD students.

2.1 Academic and Research Resources of BBRS

The Department of Biomedicine is the result of a merger in 2004 between three pre-clinical departments (Anatomy and Cell Biology, Physiology and Biochemistry and Molecular Biology). Today, the Department represents and is almost solely responsible for the "Pre-Clinical" component of the many educational programs offered by MOF. The Department is comprised of eleven thematically-organized research groups, two national technology platforms and a K.G. Jebsen Center. Together, the research groups constitute a broad and advanced learning environment and a solid platform for educating and developing the scientific careers of PhD-students.

The research of the department is primarily focused on basic and translational biomedical and biological problems. During the last years translational research has been more prominent, bolstered by strong collaborations between individual research groups and the clinical departments at the Haukeland University Hospital. The department is involved in extensive national and international collaborations. Additionally, a large percentage of the faculty has been recruited from abroad many of which have maintained good international collaborations and networks into which PhD students are readily included.

The research performed at the Department is organized around eleven research groups and two national technology platforms. Each of the research groups is an economically separate entity, with the allocation of resources (funding and staffing) decided by the individual group

leader. Together, the scientific and technical staff of these milieus and their different research areas will constitute the PhD student's tutoring and learning base.

The Research Groups:

Biorecognition
Cellular Dynamics and Communication
Craniofacial Developmental Biology
Neurotargeting Research Group
Translational Cancer Research Group
Neural Networks Research Group
Cellular Networks
Cardiovascular Research
Matrix Biology
Neuroscience Research Group
Translational Signaling Group

The Platforms:

Proteomics Unit at the University of Bergen (PROBE)
Molecular Imaging Center (MIC)
Unit for nano-system in biomedicine (UnB)

2.2 Collaboration with business/industry

Several lines of research within the Department of Biomedicine have been amenable to collaborations with industry. Two companies, *BerGenBio AS* and *UniTargetingResearch AS*, (together employing 10-12 people) have been started by researchers in the Department and provide active collaborations and opportunities for students. The Cellular Networks Research Group has received two commercialization program stipends (FORNY) from the RCN and has applied for a third. These stipends have the intent to introduce researchers to new opportunities in industry. In addition, a Biomedical Incubator will soon be housed in our building with the goal of developing startup companies. Since 2005, 40+ ideas from researchers in our Department have been submitted to the Bergen Technology Transfer Office (BTO), resulting in the application of 25 patents and, to date, four license agreements. We see this focus on commercialization as an increasingly essential part of PhD student education and the BBRS, as well as a value to society and the local community. An important benefit is that these activities allow students to become aware of career opportunities outside of academia.

2.3 National and international research collaboration and networking

On a departmental level, several research and equipment collaborations are focused around the Department's two technology platforms (MIC and PROBE). In addition, the Department has extensive collaborations across Faculties. Some of these interdisciplinary collaborations have led to the development of Research

Schools that promote the training of students in multidisciplinary research that is increasingly required in today's research environment, with few borders between basic, translational and applied research. Several research groups are involved with relatively new and exciting programs; for example, the *Nanoscience Program at UiB* and *MedViz*, a research and development cluster performing advanced image analysis and visualization for medical use.

The Department also has substantial and successful translational research links to Haukeland University Hospital. In particular, long-term collaborations with the Departments of Internal Medicine (Hematology, Nephrology and Oncology), Surgery (Neurosurgery, Anesthesiology and Orthopedics), Clinical and Molecular Medicine (Genetics, Psychiatry, Gynecology, Ophthalmology), Department of Neurology and the Center for International Health have resulted in several publications and joint dissertations. In addition, there are collaborations with the Departments of Molecular Biology, Biology, Chemistry, Physics and Technology, Mathematics and Informatics with joint supervision of students, teaching programs and multidisciplinary research.

Individual members and research groups in the Department have been very active and successful in collaborations related to EU funding opportunities and have both directed and taken part in Research Training Networks and Projects in FP2 through FP7.

Del 3: Ressurser

The BBRS complies with all regulations required of a PhD program within both the Faculty of Medicine and Dentistry and at UiB. The organization of BBRS is entirely within the realm of the Department of Biomedicine.

BBRS will be lead and organized by a board consisting of three permanent faculty members representing the departmental research groups and platforms, and two PhD-students appointed or elected by the students. For the first two years, the board will be headed by

Marion Kusche-Gullberg. The BBRS board will operate as a sub-committee of the Research Committee of the Department to ensure and maintain a tight link between BBRS and the ongoing research of the department. The PhD coordinator at the department will be responsible for the administrative duties of BBRS. The board will meet two times each semester and will have the responsibility to approve new courses and activities for the students. Board members will serve for two year-terms and can serve more than one term. Board members will be appointed by the Head of Department.

Contact Person(s):

Marion Kusche-Gullberg (Leader of the BBRS)
Anne Berit Apold (Administrative coordinator BBRS)

Members of the Board:

Jim Lorens
Clive Bramham
Knut Teigen

It is a goal of the BBRS that the board reflects a broad research background, the areas of research of the department and a good knowledge of the different local and national research schools that BBRS will cooperate with.

Budget

Own funding:

- 7 credits: Introduction courses
- 70 credits: courses at 300-level
- 24 credits: courses at 900-level

All together 101 stp. If each academic staff teaches 30 credits per semester this is equivalent to at least 3 academic staff (600 000 kr/position): 1 800 000 kr

- Web site– establishing and maintaining (T. Ravnskog) 25 000 kr
- BBB-seminars 180 000 kr

All together own funding: 2 005 000 kr

Additional budget requirement

Yearly seminar for the whole school, based on 100 participants:	200 000 kr
Establishing 4 new courses each 5 credits (900-level):	
• CourseN1 – 20%-position and operating costs	300 000 kr
• CourseN2– 20%-position and operating costs	300 000 kr
• CourseN3 - 20%-position and operating costs	300 000 kr
• CourseN4 – 20%-position and operating costs	300 000 kr
Total additional budget requirement	**1 400 000 kr**

These total funds (own funding + additional budget requirement) will be used to run the courses and support of the courses, and to finance a yearly one day off-site meeting for the research school. Money will also be set aside such that the PhD students can invite external speaker via the BBB seminar series at least once a year. BBRS will also develop a web-site to provide networking opportunities for students and alumni.

The additional budget requirement applied for in this application, will be used to establish 4 new courses on 900-level which will be of interest also beyond the department. Two of the courses is planned to involve biomedical topics related to imaging and PET interfacing with physics and chemistry. The other two courses are planned to present biomedical methods related to our research groups, so that all students are offered a broad methodical education.

Del 4: Aktivitetsplan

The major theme of BBRS is to provide the basic and translational research skills that will provide the scientific tools for our PhD students to pursue a career research, education or industry in the biomedical sciences, nationally or internationally.

The Department of Biomedicine is associated with several other research schools at the University of Bergen and nationally, but now wants to focus on providing a solid training environment for its PhD candidates in the field of basic and translational research. *The Research School for Translational Cancer Research* opened in 2005 with the main goals of strengthening the education within the field of translational cancer research and increasing the scientific co-operation between research groups within basal, para-clinical and clinical cancer research, will be incorporated into BBRS. Other schools that the Department is involved in include: *The Integrated Graduate School in Neuroscience, Bergen Research School in Inflammation, Molecular and Computational Biology Research School in Bergen* and *the*

National Graduate School in Structural Biology and the *Norwegian Research School in Medical Imaging* at the national level.

PhD students are part of, and profit from, the inspiring and international atmosphere, and the ongoing collaborative and cross-disciplinary research conducted by the participating groups. Research centers and facilities provide the infrastructure for an internationally recognized excellent research and training environment to the benefit of young researchers. BBRS aims at strengthening and further developing existing scientific networks, and building new ones for the candidates.

A total of 30 credit points (ECTS) are needed to fulfill the requirements for the PhD degree, in addition to the thesis and research work.

Mandatory courses offered by MOF:

MEDMET1	Basic course in medical and health related research	8 credits

Mandatory courses offered by BBRS:

An annual introductory course	2 credits
BMED380 BBB-seminar series	5 credits

Elective courses offered by BBRS:

300-level:

BMED330	Cell communication and intracellular signaling	10 credits
BMED331	Tumor biology	10 credits
BMED339	Neurochemistry	5 credits
BMED356	Cardiovascular physiology	5 credits
BMED357	Neurophysiology and neurobiology	5 credits
BMED358	Cellular neurophysiology - Ion channels and membrane excitability	5 credits
BMED359	Cardiovascular physiology	10 credits
BMED360	In vivo imaging and physiological modeling	10 credits
BMED380	Seminar series	5 credits
BMED381	Biomedical Nutrition Physiology	5 credits

900-level:

BMED901	Biomedical Research Course: Neuroscience	3 credits
BMED902	Biomedical Research Course: Circulation	5 credits
BMED903	Biomedical Research Course: Molecular techniques for cloning and expressing of eukaryotic proteins	5 credits
BMED904	Biomedical Research Course: Matrix biology	3 credits

BMED905	Biomedical Research Course: Proteomics	6 credits
BMED907	Junior Scientist Mini-Symposium	2 credits

The courses will be evaluated by the board every year and will be coordinated with the special courses offered by the collaborating national research schools.
The mandatory introduction courses will normally be compatible with other research schools' introduction courses.

Other activities:

Off-site meeting once each year. For example an all-day meeting with selected student speakers, a topical lecture (i.e. "how to find a postdoc position") and poster session. Lunch provided.

Del 5: Krav til kandidaten

The BBRS research school encompasses graduate training programs for PhD students connected to research projects coordinated by the Department of Biomedicine. Applicants should hold an MSc (or an equivalent degree) in biological sciences, biochemistry, medicine or a related discipline.

Although students specialize in a particular research topic, the interdisciplinary context of the program facilitates interactions with other research groups and fosters the ability of cross-frontier thinking. Laboratory work is supplemented by seminars, elective courses, training in creative problem solving and strategic thinking and participation in national and international conferences.

In order to ensure that the training is completed within the prescribed timeframe as far as possible, we have a midway evaluation of the progress of the PhD students. To document in-depth knowledge of the research field and to discuss progress, PhD students describe the research project in a short written report and an oral presentation. The oral presentation is

given in the presence of the supervisor and a committee appointed by the departmental Research Board (MEIBM900, 1 credit).

Several initiatives are in place to support PhD students to become independent researchers. Students are encouraged to apply for their own funding for travel and project expenses. Students are encouraged to take part in journal clubs, seminars and the Junior Scientist Mini-Symposium (3 times per semester).

Summary:

The Department of Biomedicine has excellent qualifications and experience to offer a comprehensive research school to Norwegian and International students interested in basic and translational biomedical research.

Signature research school leader

Signature head of department