

## PhD Program *Cell Migration*

*“Cell Migration in Immunosurveillance, Inflammation, Tumorigenesis and Metastasis”*

**Cell migration** is a fundamental process of life. Unicellular organisms such as amoeba have to migrate to reach food and to mate. In multicellular organisms, cell migration of individual cells or coordinated multicellular migration is required for gastrulation, morphogenesis and organogenesis (e.g. angiogenesis). Furthermore, the entire homeostasis of multicellular organisms relies on processes of cell migration including the process of immunosurveillance. Finally, cell migration is a crucial process during inflammation and tissue repair and is an integral mechanism of many pathological processes such as chronic inflammatory diseases and tumor metastasis. Immune and tumor cell migration are therefore two topics of utmost biomedical significance.

The PhD Program Cell Migration is organized by a growing group of highly innovative and successful Swiss research groups in the field of cell migration in morphogenesis, immunosurveillance, inflammation and cancer. The presently participating institutions with their principal investigators bring together complementary scientific expertise and methodological skillsets in the field of cell migration that permit for embedding a cutting-edge Swiss training program on Cell Migration for highly qualified and motivated PhD and MD-PhD students in the fields of biology, biochemistry, (molecular) human and veterinary medicine, immunology, pharmaceutical sciences, chemistry, physics, bioinformatics and mathematics with a focus on life sciences.

### Lecturers:

| University                         | Faculty                         | Institution  | Lecturer   |
|------------------------------------|---------------------------------|--|--|
| University of Bern                 | Medical Faculty                 | Theodor Kocher Institute                                     | Prof. Dr. Britta Engelhardt<br>Dr. Urban Deutsch<br>Prof. Dr. Ruth Lyck<br>Dr. Steven Proulx |
|                                    |                                 | Department of Visceral Surgery and Medicine                  | Prof. Dr. Joel Zindel  |
|                                    | Vetsuisse Faculty               | Department of Clinical Research and Veterinary Public Health | Prof. Dr. Anna Oevermann   |
| University of Fribourg             | Faculty of Science and Medicine |  | Prof. Curzio Rüegg<br>Prof. Jens Stein   |
| University of Geneva               | Medical and Science Faculties   |  | Prof. Carole Bourquin<br>Prof. Christoph Scheiermann   |
| Univeristà della Svizzera italiana | Facoltà die scienze biomediche  | Institute for Research in Biomedicine (IRB)                  | Prof. Dr. Marcus Thelen,<br>Prof. Dr. Santiago F. Gonzalez<br>Prof. Dr. Mariagrazia Ugucioni |
|                                    |                                 | <b>Biotechnology Institute Thurgau (BITg)</b>                | Prof. Dr. Daniel Legler<br>Dr. Julia Gutjahr   |

### PhD Cell Migration Program

The formal teaching courses consist of lectures, practical courses, journal clubs where credit points are assigned. Each doctoral student must collect a minimum of **10 credit points**; at least **3** of them must come from lecture courses, **2** from practical classes, **2** from the web-based Journal and Literature Clubs

or institutional Journal Clubs. The remaining 3 ECTS can be obtained by the attendance of the Module I in Animal Experimentation (LTK1), which we consider mandatory for the state-of-the art education of students performing experimental animal work in the context of cell migration, and/or any other suitable class as the selection of courses highly depends on the previous experience/training and the outline of the research project.

## Teaching portfolio:

### Lectures:

The lectures can be attended in person or via online platforms from the partner universities

- Dynamics of cellular contacts: Cell-cell contacts and cell motility, UNIBE (coordinated by B. Engelhardt) 3 ECTS
- Molecular Biology of Inflammation, UNIBE (coordinated by B. Engelhardt) 3 ECTS
- Lecture Series on Advanced Microscopy, UNIBE (coordinated by R. Lyck) 3 ECTS
- Ask the expert – thematic modules Immunology; Replacement of Animal Experiments, UNIFR (coordinated by J. Stein, C. Rüegg) 2 ECTS
- Seminar in Immunology and Cell Biology, BITg (coordinated by D. Legler), 1 ECTS
- Immunology from A to Z, UNIGE (coordinated by C. Bourquin and C. Scheiermann).
  - Module 1: Basic Immunology, 2 ECTS
  - Module 2: Advanced Immunology, 2 ECTS
- Challenges in Clinical Oncology, UNIGE (coordinated by C. Bourquin), 2 ECTS
- Hot Topics in Immunology and Immunopharmacology, UNIGE (coordinated by C. Scheiermann and C. Bourquin), 1 ECTS
- Lecture/seminar series on selected topics of Cell Biology, IRB, 2 ECTS
- Lecture course IRB International PhD Program in Immunology, Cell Biology and Biochemistry” <https://www.irb.usi.ch/phd-program>, IRB, 1 ECTS

### Practical classes, courses

- GCB course Cell Migration, TKI at UNIBE with BITg, 5 days, 2 ECTS
- GCB course Vascular Biology, TKI at UNIBE, 5 days, 2 ECTS
- Microscopy Imaging Center (MIC) at UNIBE, Trainings and Workshops, *variable ECTS*
- Principles in Transgenic Mouse Technology, TKI at UNIBE, 2 days, 1 ECTS
- Module 1 in Animal Experimentation LTK1, courses to be booked individually, 2 ECTS
- Determination of Macromolecular Structures, Universität Konstanz (coordinated by M. Kovermann, O. Mayans), 0.5 ECTS
- Analysis and Exploration of Metabolic Networks, Universität Konstanz (coordinated by F. Schreiber, K. Klein, M. Aichele), 0.5 ECTS
- Bioimaging I, Universität Konstanz (coordinated by M. Stöckl, E. May), 1 ECTS
- Frontiers in Bioimaging, Universität Konstanz (coordinated by E. May, M. Stöckl), 1 ECTS
- Proteomics, Universität Konstanz (coordinated by A. Marquardt), 1 ECTS
- Protein Folding, Universität Konstanz (coordinated by M. Kovermann), *variable ECTS*
- Principles and Application of Flow Cytometry & Cell Sorting, Universität Konstanz (coordinated by A. Sommershof), 1 ECTS
- Versuchstierkunderkurs, Universität Konstanz (coordinated by G. Mende), 2 ECTS
- Scientific Presenting, Universität Konstanz (coordinated by M. Unterlass), 0.5 ECTS
- Scientific Graphic Design, Universität Konstanz (coordinated by M. Unterlass), 0.5 ECTS
- Statistical Literacy, Universität Konstanz (coordinated by P. Mayer), *variable ECTS*
- Advanced Flow Cytometry workshop, UNIGE, 0.5 ECTS
- Ask the expert workshop, UNIGE, 0.5 ECTS
- Scientific networking: how to promote your career while drinking coffee, UNIGE, 0.5 ECTS
- Model approaches to image analysis, IRB at UNIBE, 3 days 1 ECTS
- Microscopy Applications for Immunological Research, IRB (coordinated by M. Thelen), 1.5 ECTS
- Chemokines and Chemokine Receptors, IRB, 0.5 ECTS

- Course on multicolour flow cytometry, IRB, 1 ECTS

### Tutorials, Literature and Journal Clubs

The Cell Migration doctoral students will be brought up to date with the current literature in the field.

- Immunology Tutorial – coordinated by GCB UNIBE– 3 ECTS
- Journal Club – NeuTraVas *Neuroinflammation, Cell Trafficking and Vascular Biology*, TKI, 1 ECTS
- *E-Literature Club*: On a monthly basis the PIs will upload a seminal publication or review to an e-reading platform (e.g. Perusall; <https://perusall.com>) allowing for shared reading – 1 ECTS
- Journal Club in Cancer Immunology, coordinated by UNIGE, 1 ECTS
- Journal Club in Cell Biology and Immunology, weekly, IRB, 1 ECTS
- Journal Club in Cell Biology and Immunology, BITg, 1 ECTS
- *Faculty of Students*: Following the “Faculty of 1000” scheme each PhD student will be assigned 1-3 relevant scientific journals and is asked on a weekly basis to recommend publications with a short comment to the internal webportal – - coordinated by UNIBE, 1 ECTS

### Additional parts of the program – ECTS depending on activity and time

#### Laboratory Rotations

To support cross-disciplinary approaches, the program supports short-term laboratory rotations, in which interested PhD students have the opportunity to carry out up to two laboratory rotations in another laboratory of the participating PIs in the program.

#### Annual CellMigration Retreat (0.5 ECTS)

An important highlight of the program will be the annual retreat where all students present their work in short talks and posters. Moreover, students will receive independent feedback on their individual research project from invited international experts in the field. These retreats have proven to foster cross-disciplinary networking amongst the students and research groups working on cell migration in Switzerland.

#### Cytomeet (0.5 ECTS participation with presentation)

The Cytomeet is a well-established one-day meeting for the Swiss scientific community interested in mechanisms of cell migration in vivo and in vitro. It takes place on a Tuesday in January of each year in Bern and is organized by Britta Engelhardt, Daniel Legler and PIs of the PhD Cell Migration program.

#### Soft skills and interdisciplinary courses

The program will advise students in participating in courses covering novel technologies, such as ‘omics’ approaches in life sciences and medicine, computational data analysis, including machine learning and Artificial Intelligence which are already offered across the disciplines of the participating institutions.

#### For the supervision of a master student up to 2 ECTS can be gained

- 0.5 ECTS for supervising a medical master student during 8 weeks
- 1 ECTS for supervising a biomedical master student during 6 months
- 2 ECTS for supervising a master student during 1 year

## Regulations of the PhD Program Cell Migration

### 1. Who can apply?

- PhD students accepted at any of the participating Universities and Institutes
- PhD students enrolled in the GCB of the University of Bern
- PhD students with a focus on cell migration in their PhD project
- PhD students benefiting in their PhD thesis project from skills obtained in this program

### 2. How do PhD students get to know the PhD program Cell Migration?

- recommendation through their supervisor
- recommendation through the staff of the GCB of the University of Bern or comparable programs at the participating Universities
- recommendation by their GCB mentor, co-supervisor and/or supervisor
- information on the GCB homepage
- information on the appropriate homepages of the partner Universities and Institutions

### 3. Process for getting enrolled

- Students contact the Coordinator of the Program – Prof. Britta Engelhardt ([britta.engelhardt@unibe.ch](mailto:britta.engelhardt@unibe.ch)) and the admin team ([sekretariat.tki@unibe.ch](mailto:sekretariat.tki@unibe.ch))
- Students receive the information about the program and the mandatory courses as well as i) the registration form and ii) the form for their individual curriculum, which they have to complete continuously.
- Students return the completed and signed registration form to Prof. Britta Engelhardt ([britta.engelhardt@unibe.ch](mailto:britta.engelhardt@unibe.ch)) and the admin team ([sekretariat.tki@unibe.ch](mailto:sekretariat.tki@unibe.ch)) accompanied by documentation of their enrollment in the GCB or acceptance as PhD student in any of the participating Universities
- Enrollment in the PhD Program Cell Migration will be decided by the program coordinator, Prof. Britta Engelhardt.