# PhD Guidelines of the Helmholtz Einstein International Berlin Research School in Data Science (HEIBRiDS)

# 1. The HEIBRiDS Data Science School

In 2018 the Einstein Center Digital Future (ECDF) and the Helmholtz Association established HEIBRiDS, the Helmholtz Einstein International Research School in Data Science. As an interdisciplinary program, HEIBRiDS trains young scientists in Data Science applications within a broad range of natural science domains, spanning from **Earth & Environment**, **Astronomy**, **Space & Planetary Research** to **Geosciences**, **Materials & Energy** and **Molecular Medicine**. The mission of HEIBRiDS is to educate new generations of researchers, who, as skilled data scientists, understand the demands and the challenges of the disciplines in which data science has become indispensable.

HEIBRiDS brings together six Helmholtz Centers and four university partners from ECDF, with **25 fully-funded PhD projects** at the intersection of **Data Management**, **Machine/Deep Learning, Imaging, Mathematical Modelling and High-throughput Data Analytics**.The training program applies the cotutelle training principle that involves one supervisor from a Helmholtz partner and one from an ECDF partner. Annual meetings with the Thesis Advisory Committee (TAC) and a combination of a core research program and individual training sessions are the foundation of the HEIBRiDS training program.

HEIBRiDS is one of the six Helmholtz Information and Data Science Schools (HIDSS) under the roof of the Helmholtz Information & Data Science Academy (HIDA). As part of HIDA, attractive data science events, symposia and courses are made available to HEIBRiDS doctoral researchers, and research stays within Germany or abroad are facilitated.

Collaborating Helmholtz Centers include the Alfred Wegener Institute for Polar and Marine Research (AWI), the Deutsches Elektronen-Synchrotron (DESY), the German Aerospace Center (DLR), the German Research Centre for Geosciences (GFZ), the Helmholtz Zentrum Berlin for Materials and Energy (HZB), and the Max-Delbrück Center for Molecular Medicine (MDC). ECDF partners in the program are Freie Universität Berlin (FU), Humboldt-Universität Berlin (HU), Technische Universität Berlin (TU) as well as Charité-Universitätsmedizin Berlin.

The PhD guidelines of the HEIBRiDS Data Science School are described in the following pages and shall facilitate and guarantee the productive and efficient progression of the HEIBRiDS PhD projects. As the Helmholtz centers are not degree-awarding institutions, each student has to be admitted and enrolled at an ECDF partner university and has to meet - in addition to the present guidelines - the academic requirements of the degree-granting faculty and the standards of Good Scientific Practice. The PhD guidelines herein apply to all HEIBRiDS doctoral students.

# 2. Entry and Registration of Doctoral Students

Doctoral students enter the HEIBRiDS Data Science School by applying to the PhD program. The assessment procedure during the recruitment week consists of several elements, such as presentations, panel discussions and one-to-one interviews. Moreover, applicants have the opportunity to attend talks by recruiting group leaders presenting the available projects, or visit the labs of their interest. The selected applicants are automatically registered with the HEIBRiDS Data Science School as soon as they start their PhD project.

All new HEIBRiDS doctoral students are invited to an orientation session, which gives an introduction to the HEIBRiDS Data Science School and its training curriculum.

## 3. University Affiliation

In Germany, the right to award academic degrees resides exclusively with the university departments or faculties (Fachbereiche or Fakultäten). Doctoral students have to be admitted and enrolled at an ECDF partner university to receive their doctoral degree. The ECDF partner universities of HEIBRiDS are: Humboldt-Universität zu Berlin (HUB), Technische Universität Berlin (TU), Freie Universität Berlin (FUB) and Charité-Universitätsmedizin Berlin. The HEIBRiDS Office gives advice on the procedures of partner universities and supports the paper work for admission process. Doctoral students have to register with the ECDF partner university that one of their supervisors is affiliated with. In the case that the university supervisor is not the main project supervisor, doctoral students have to ensure that the writing, submission and publication of the doctoral thesis are in consultation and agreement with the main project supervisor.

The doctorate procedure is comprised of three parts:

1. Admission of the research project with a university supervisor and enrollment at the university
2. Submission of thesis and doctorate examination. This includes the appointment of the examination panel and the public defense of the thesis, disputation, or viva
3. Publication of thesis and submission to university library
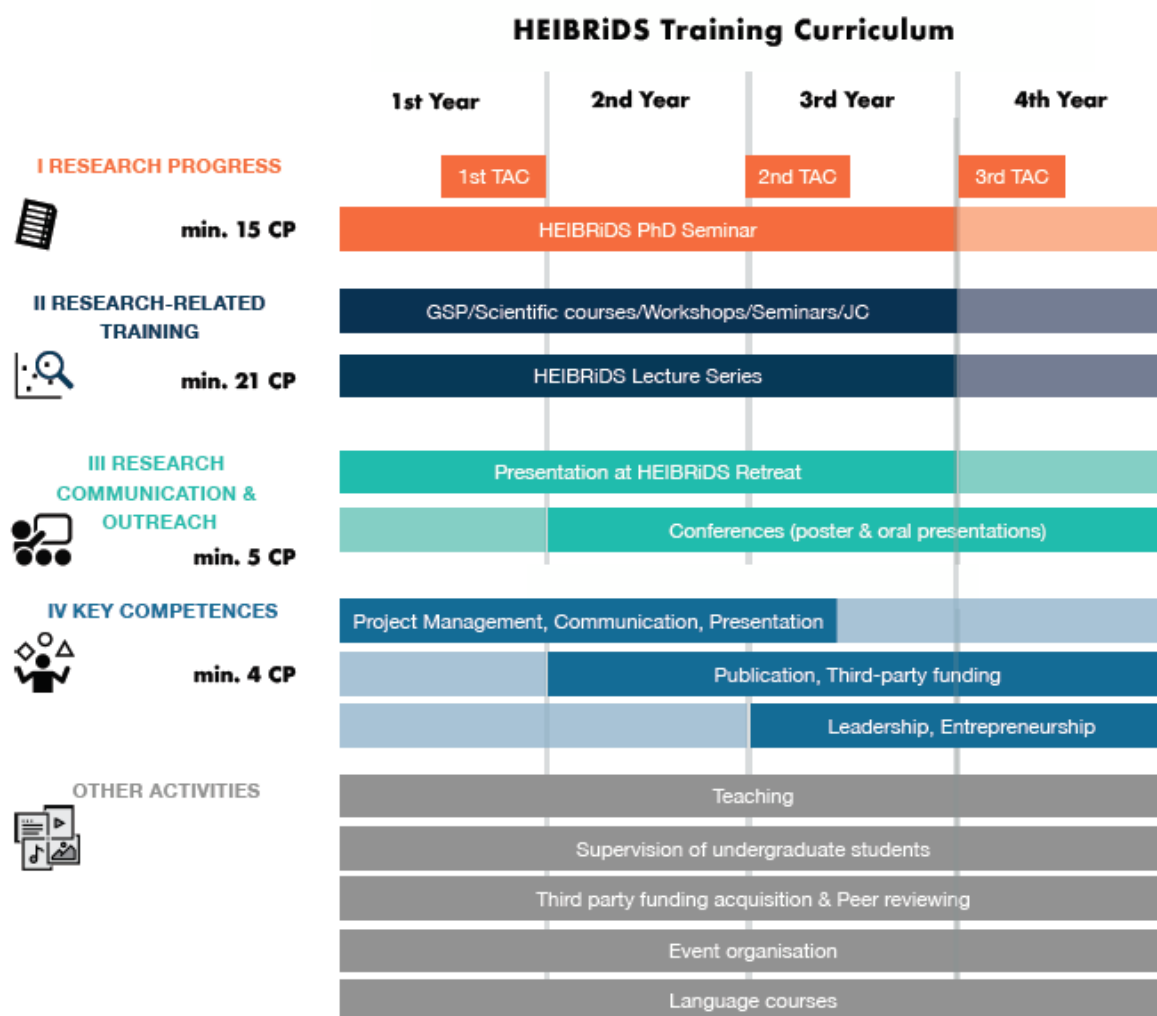
Each university department or faculty has its own Doctorate Regulations (Promotionsordnung). They set out eligibility criteria, curriculum requirements, how the thesis should be submitted and published and how the oral examination (viva voce) should be organized. The doctorate will be completed in accordance with the Doctorate Regulations of the respective universities.

**All students are expected to complete the admission and enrollment process by the time of their first Thesis Advisory Committee (TAC) meeting.**

## 4. Training Curriculum

Over the period of research work, doctoral students need to complete the training curriculum of the HEIBRiDS Data Science school. A broad spectrum of lectures, seminars, courses and

other training activities allows all doctoral students to customize their curriculum based on research interest and personal needs. All training activities shall be decided in dialogue with the supervisors. The mandatory elements of the HEIBRiDS Training Curriculum sum up to 45 credit points (CP) and are clustered into four modules, as visualized below and, in more detail, in Annex I:

## HEIBRiDS Training Curriculum

| | 1st Year | 2nd Year | 3rd Year | 4th Year |
|---|---|---|---|---|
| **I RESEARCH PROGRESS** — min. 15 CP | 1st TAC | | 2nd TAC | 3rd TAC |
| | HEIBRiDS PhD Seminar | | | |
| **II RESEARCH-RELATED TRAINING** — min. 21 CP | GSP/Scientific courses/Workshops/Seminars/JC | | | |
| | HEIBRiDS Lecture Series | | | |
| **III RESEARCH COMMUNICATION & OUTREACH** — min. 5 CP | Presentation at HEIBRiDS Retreat | | | |
| | | Conferences (poster & oral presentations) | | |
| **IV KEY COMPETENCES** — min. 4 CP | Project Management, Communication, Presentation | | | |
| | | Publication, Third-party funding | | |
| | | | Leadership, Entrepreneurship | |
| **OTHER ACTIVITIES** | Teaching | | | |
| | Supervision of undergraduate students | | | |
| | Third party funding acquisition & Peer reviewing | | | |
| | Event organisation | | | |
| | Language courses | | | |

## 1. Research Progress

The HEIBRiDS doctoral students are mentored by a **tandem** of a **primary supervisor** and a **co-supervisor**. The close day-to-day supervision is complemented with the Thesis Advisory Committee (TAC), consisting of the two project supervisors and at least one independent scientist from the Helmholtz centers or the ECDF partner universities.

All HEIBRiDS doctoral students are required to participate in annual TAC meetings, which provide a platform for monitoring and ensuring the quality of the research project. The TAC offers feedback on the project proposal in the first year, and reviews the progress and personal development in the following years.

The organization of the TAC meetings is the responsibility of the doctoral student and shall follow the following schedule:

- Presentation & discussion (30min)
- Committee resumes in the absence of the PhD student (5min)
- Committee members receive feedback from doctoral student in the absence of the direct supervisors (15min)
- Feedback including advise on training activities (10min)

Complementary to tandem supervision and the TAC, HEIBRiDS doctoral students receive peer feedback at the bi-monthly PhD Seminar.

### 1st TAC Meeting: Research proposal (within months 6-12)

The doctoral student prepares a written project proposal in consultation with their supervisors. The project proposal shall be sent to all members of the TAC and to the HEIBRiDS Office at least one week before the meeting, alongside with the admission letter from the university.

The TAC evaluates the feasibility of the proposal for a four-year project, and further overviews training requirements and accomplishments to recommend extension of the project after the first year. The doctoral student summarizes the conclusions and recommendations in the TAC meeting protocol, which is signed by the supervisors and sent to the HEIBRiDS Office within three weeks from the meeting.

### 2nd TAC Meeting: Progress report (within months 24-30)

The project progress is presented to the TAC at the end of the second or  beginning of the third year. The written report shall not exceed ten pages, excluding references. The report shall be sent to the members of the TAC and the HEIBRiDS Office at least one week before the meeting.

The main responsibilities of the TAC are to review the project progress over the last year, to discuss the time management plan, and to outline the research objectives and activities for the following year. Additional training requirements, including research training and soft skills courses shall be considered and determined in dialogue with the committee. The doctoral student summarizes the conclusions and recommendations in the TAC meeting protocol, which has to be signed by the supervisors and sent to the HEIBRiDS Office within three weeks from the meeting.

At the end of the third or beginning of the fourth year the doctoral student prepares a final report along with a time management plan for the completion of the doctorate and the submission of the thesis, which shall be presented to the Committee during the third TAC meeting. The final report includes a thesis content outline and a suggestion for the composition of the Thesis Defense Committee. The report shall be sent to the members of the TAC and the HEIBRiDS Office at least one week before the meeting.

The TAC evaluates the feasibility for completing the project work and writing the thesis within the time specifications. If the submission cannot be accomplished within the fourth year, the TAC can suggest an additional extension of six months. In the event of an extended sick leave, parental leave etc., the contract is entitled to be extended accordingly. Additional training requirements, including research training and soft skills courses shall be considered and determined in dialogue with the committee.

The doctoral student summarizes the conclusions and recommendations in the TAC meeting protocol, which has to be signed by the supervisors and sent to the HEIBRiDS Office within three weeks after the meeting.

Extension of the employment status beyond four and a half years requires that the doctoral student and the project supervisors develop a completion strategy, which is reviewed by the HEIBRiDS Program Committee at least six months before the end of the contract. After evaluation of the proposal, the HEIBRiDS Program Committee recommends conditions for a final contract extension to the host institution.

**The salary of the doctoral student during the fourth year of studies, as well as during any further extension of the contract is to be covered by the main supervisor.**

## II. Research-related Training

The research-related training module provides a wide range of lectures and workshops to enhance scientific skills and expertise. In addition to the research-related training organized by the HEIBRiDS Data Science School, each university and research center offers its own set of research-related courses. Due to the interdisciplinary nature of the HEIBRiDS program, the scientific training shall complement the background of the doctoral student, e.g. students with strong data science background shall select courses primarily from the particular application domain, whereas candidates with a strong application domain background should select courses on data science. In addition to research-related training organized by the HEIBRiDS Data Science School, HEIBRiDS PhD students can attend courses offered by the Helmholtz Association, all partner Helmholtz Centers, HIDA and the [Berlin University Alliance](#). Research-related training shall be decided after agreement with the supervisors.

## III. Research Communication and Outreach

Doctoral students are strongly encouraged to play an active role in the scientific community, e.g. communicating their research to a scientific audience in lab meetings and research seminars, by inviting guest speakers, organizing meetings and colloquia, etc. Furthermore,

doctoral students must present their research project at the annual HEIBRiDS Retreat. The HEIBRiDS Retreat is an important part of the curriculum, fostering scientific cross-disciplinary exchange and interaction. This event is organized with the active support of doctoral students, providing valuable lessons in organization and communication skills. In addition, doctoral students shall present their scientific work at least twice at an international conference.

### IV. Key Competences

Soft skills training and career development for early-career researchers is an integral part of the broader range of activities supported by the HEIBRiDS Data Science School. In addition to soft skills training organized by the HEIBRiDS Data Science School, HEIBRiDS PhD students can attend courses offered by the Helmholtz Association, all partner Helmholtz Centers, HIDA and the Berlin University Alliance.

### Other Activities

Doctoral students are strongly encouraged to play an active role in the scientific community, e.g., contribute to university teaching and supervision of BSc and MSc students, organize meetings and colloquia, etc.

## 5. HEIBRiDS Transcripts and Certificates

Training records, thesis reports and TAC meeting protocols are maintained at the HEIBRiDS Office. Doctoral students may review their academic record and information upon request.

An official transcript containing the research-related training program and personal development achievements and the HEIBRiDS certificate is prepared by the HEIBRiDS Office after submission of the thesis to the corresponding university.

## 6. Change of Research Group, Withdrawal and Dismissal

If a doctoral student wishes to change research group or if a supervisor seeks to dismiss a student, the HEIBRiDS Office shall be contacted ensuring that both are aware of pending action.

Change of Supervisor

In the case of change of the primary supervisor, the doctoral student must submit a short, written statement to the HEIBRiDS Office. A Thesis Advisory Committee meeting with the new supervisor shall be scheduled within the first six months after the change, which shall include the new research proposal or any modifications to the original research proposal (if the latter has already been submitted). The contract will be continued until the three years of HEIBRiDS funding are completed. **The new supervisor shall guarantee continued funding after expiration of HEIBRiDS funding to completion of the research project.**
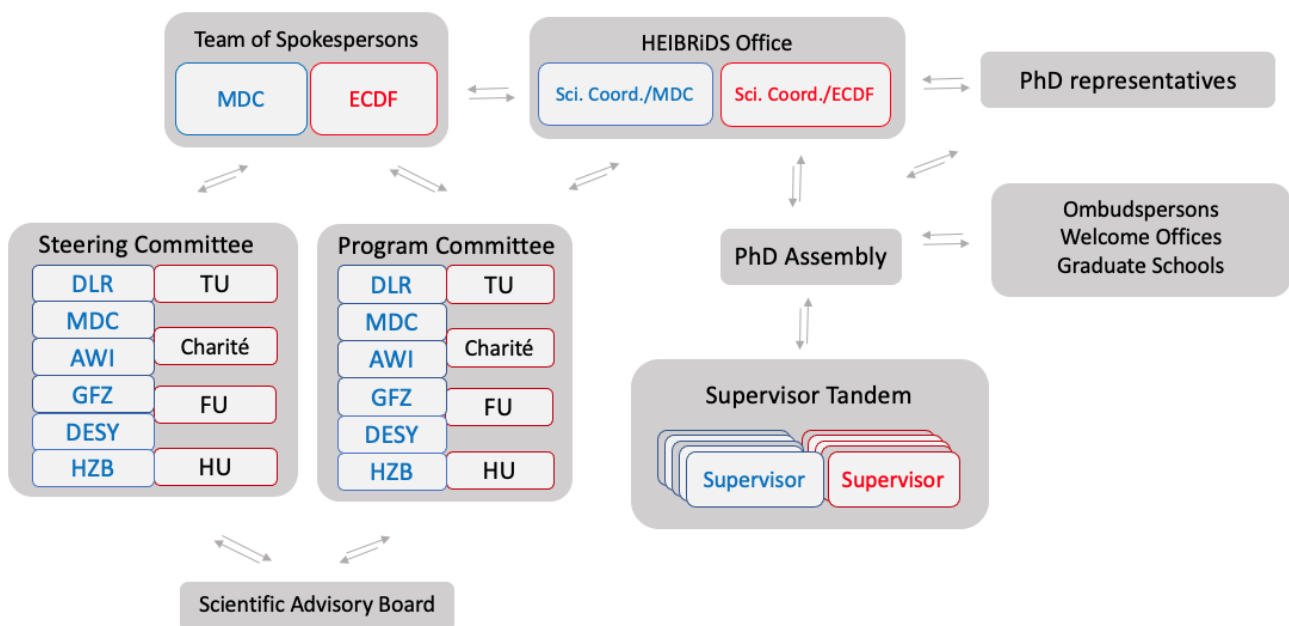
<u>Withdrawal and Dismissal</u>

If a doctoral student wishes to abort the doctoral project, a short, written statement must be submitted to the HEIBRiDS Office. The project supervisors must also submit a short, written statement.

# 7. Responsible Research Conduct and Academic Standard

Every doctoral student is expected to be familiar and comply with the rules of Good Scientific Practice of the respective host institution. All documents presenting research data have to be discussed with the project supervisors, including the doctoral thesis.

HEIBRiDS adheres to principles of responsible research, good scientific practice, openness, and transparency, and is committed to setting a good example as a scientific environment, where scientists can flourish and grow, independently of their national or ethnic background, functional variation, sex/ gender identity/alignment/orientation, family configuration, or other such feature of their persons or contexts.

# 8. Governance and Structure of the HEIBRiDS Data Science School

**HEIBRiDS Research Community**

All HEIBRiDS doctoral students and supervisors are **members** of the HEIBRiDS Data Science School.

**Assembly of doctoral students, PhD representatives and Ombudspersons**

All doctoral students make up the general **PhD Assembly** and are represented by two elected **PhD Representatives**. The PhD Representatives give the PhD assembly a formal voice in the operation of the HEIBRiDS Data Science School and communicate all relevant subjects to the Program Committee. The PhD Representatives are further involved in planning of student events and networking opportunities, and in supporting the integration of international students. The PhD representatives are elected by the doctoral body. Every PhD Representative shall be in office for the duration of 12 - 24 months.

The **Ombudspersons** of the respective universities and Helmholtz partners are available to doctoral students of HEIBRiDS for consultation. Ombudspersons support doctoral students upon request and can help them to resolve misunderstandings, express concerns, manage conflicts, and learn more productive ways of communication. In case of disagreement on terms of employment, discrimination, harassment, or problems with colleagues or supervisors, doctoral students may contact the PhD Ombudspersons under strict confidentiality.

In addition, the **Welcome Offices** and **Graduate Schools** of the respective universities and Helmholtz partners are available to the doctoral students of HEIBRiDS.

**Steering Committee**

The **Steering Committee** is responsible for all structural, scientific and financial decisions. It is comprised of 13 members representing all partner Helmholtz centers and ECDF universities. The committee meets whenever the governance policy requires its intervention, but at least biannually. Three members of the Steering Committee are members of the **Executive Board** and represent the HEIBRiDS Data Science School as spokespersons.

**Program Committee**

The **Program Committee** acts as an advisory board and supports management. It suggests projects for funding, develops the study program, and prepares admission decisions for the Steering Committee. The Program Committee consists of all active PhD project supervisors and meets biannually. Permanent guests of the Program Committee are the two PhD Representatives and the HEIBRiDS Office.

## Scientific Advisory Board

The **Scientific Advisory Board** consists of five international leading scientists with experience in interdisciplinary research and graduate education, who offer their advice on the development of the educational curricula. Members of the Scientific Advisory Board are invited to participate in events and meetings organized by the HEIBRiDS Data Science School at regular intervals.

## Administration and Management

Administration and management of the academic program is in the responsibility of the HEIBRiDS Office, which assumes the following tasks:

a. Administrative management of the HEIBRiDS PhD Program

b. Guidance to doctoral students on all matters concerning the HEIBRiDS PhD program, including curriculum, training activities, travel grants, Thesis Advisory Committees and support admission to university

c. Liaison to local universities and close collaboration with other graduate and research schools

d. Developing and implementing training and events for the doctoral community

e. Advising on external grants, professional and career development

f. Managing the HEIBRiDS PhD program including international recruitment and marketing

g. Registration, recording and monitoring of all activities and providing statistical analysis to faculty and directorate on academic matters

h. Ensuring the development, revision and implementation of policies and strategies together with the Program and Steering Committees

i. Fostering of national and international cooperation

The HEIBRiDS Office works in close collaboration with the coordinators of other graduate schools, research schools and local partners to guarantee the highest standard of structured education to all doctoral students at HEIBRiDS.

# 9. Associated HEIBRiDS Doctoral Students

Doctoral students, who are pursuing their dissertation with one of HEIBRiDS' core scientific areas (molecular medicine, geosciences, astronomy, earth & environment, space & planetary research and materials & energy), can apply to associate with HEIBRiDS and participate in

the HEIBRiDS PhD Training Program. Essential for acceptance to the program is that the PhD project has a strong data science element. When this is not already in place, it can be incorporated by affiliating to the project a HEIBRiDS mentor with data science expertise.

Interested doctoral students complete the registration form and submit an application to the HEIBRiDS Office including the following documents:

- Completed form "Request for Association"
- Letter of Motivation for joining HEIBRiDS
- CV including education details, publications, honours, etc.
- Abstract of the dissertation project (1-2 pages)
- Letter of support from the main supervisor
- Statement of approval from the potential data science mentor

Requests for association are accepted all year round. Project proposals are evaluated by the HEIBRiDS Program Committee. The Committee decides on the basis of the scientific quality and interdisciplinarity of the proposed project, as well as the competence and motivation of the doctoral student.

**Associated HEIBRiDS doctoral students have access to the workshops and seminars organized by HEIBRiDS, and are invited to participate in the annual HEIBRiDS Retreat. However, they are not expected to fulfil in the mandatory training curriculum.**

# Annex I

## Mandatory Training Components

| Module | When? | Min. mandatory CP | |
|---|---|---|---|
| **I. Research Progress** | | | |
| Thesis Advisory Committee (TAC) Meeting (including report and minutes) | Once a year | 3/yr | 9 |
| HEIBRiDS PhD Seminar | Years 1-3 | 2/yr | 6 |
| **II. Research-related Training*** | | | |
| Good Scientific Practice | Year 1 | 0,5/day | |
| Scientific courses | Years 1-3 | 5 (4hr/week/semester) | |
| Workshops | Years 1-3 | 0,5/day | |
| Seminars, Journal Clubs | Years 1-3 | 0,1/event (attendance) 0,5/event (presentation) | 15 |
| HEIBRiDS Lecture Series | Years 1-3 | 2/yr | 6 |
| **IV. Research Communication & Outreach** | | | |
| *Presentation at HEIBRiDS Retreat* | Years 1-3 | 1/year | 3 |
| *Poster/oral presentation at international, scientific conferences* | Years 2-4 | 1/presentation | 2 |
| **IV. Key Competences*** | | | |
| Recommended to select courses within: i) Project Management, communication, presentation ii) Publication, third-party funding iii) Leadership, entrepreneurship | Years 1-2 Years 2-4 Years 3-4 | 0,5/day | 4 |
| **Other (no credit points)** | | | |
| Teaching Supervision of undergraduate students Third-party funding acquisition & Peer-reviewing Event organization Language courses | | | |
| **Total Minimum Mandatory CP** | | | **45** |

**\* Courses organized especially for the HEIBRiDS students are mandatory, unless an equivalent course has already been followed.**