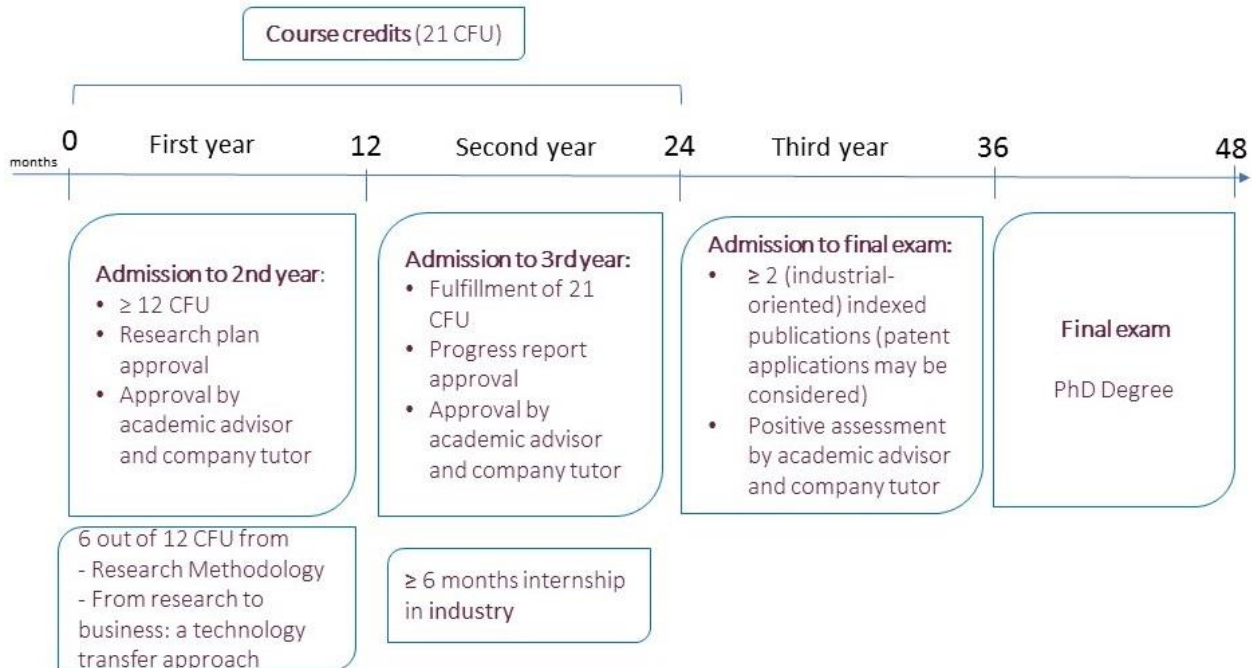*Manifesto of Studies*
Academic Year 2020 - 21

TIMELINE OF THE PHD PROGRAMME

PhD TRAINING PROGRAMME

Doctoral students must earn **21 course credits** to complete the Doctoral programme.

Credits are assigned upon completion of courses that are of the following 3 types:
- Technological/Scientific (TS)
- Soft Skills/Innovation/Entrepreneurship//Economics/Management (SKIEEM)
- Freely chosen by the PhD Student (FC)

The list of TS and SKIEEM courses for - 2020/2021 is available in Annex A.
The freely chosen courses are any course that does not appear in Annex A.

The amount of credits that must be achieved throughout the programme is described as follows:

Year	Course credits
1	**At least 12** 6 out of the 12 credits must be completed by passing: - Research Methodology course (TS) - From research to business: a technology transfer approach (SKIEEM)
2	**At least 21** The amount includes first year completed credits
3	
Total	**At least 21**

Each PhD student may follow one of the two plans below:

Plan A	Course credits	Plan B	Course credits
3 Technological/Scientific Courses	9	2 Technological/Scientific Courses	6
2 Soft Skills/Innovation/Entrepreneurship Courses	6	3 Soft Skills /Innovation/Entrepreneurship Courses	9
2 Freely Chosen Courses	6	2 Freely Chosen Courses	6
Credits	21	Credits	21

At the beginning of each year, PhD Students compile a study plan choosing courses among those proposed annually in the Manifesto. Both the academic advisor and the industrial tutor must approve the study plan by November, 30 of each year.

Any subsequent change in the study plan must be communicated to the Secretariat - industrial-innovation@unitn.it with advisor and tutor in CC - for approval.

PhD students are encouraged to attend the industrial seminars which will be suggested by the Doctoral programme (no credits awarded).

COMPULSORY COURSES THAT DO NOT GIVE CREDITS

PhD Students must complete the following courses. These courses do not give credits.

Students must provide the Secretariat with a certificate of completion of each of the below courses

Courses	Organized by	Course description	To be completed by
1. Italian Language (A1) *Only for foreign students*	CLA	https://www.cla.unitn.it/en/671/italian-for-foreigners	End of 2° year
2. Health and Safety in the workplace – Workers' General Training	UNITN E-Learning	Online course The course is available with the university credentials in the website of Didattica online. https://didatticaonline.unitn.it/ateneo/course/view.php?id=289	April, 30 of 1° year

Depending on the environment (equipment/machinery) where research activities will be performed the following courses must be completed:

3. Health and Safety (low risk) *(currently in Italian)*	UNITN E-Learning	Online course The course is available with the university credentials in the website of Didattica online. https://didatticaonline.unitn.it/ateneo/course/view.php?id=277	Before activity takes place
4. Training by the Lab/Company responsible	UNITN Department	*Only for doctoral students who carry out activities based on medium-high risk equipment and / or machinery.* The training has to be organized by the advisor / tutor and by the responsible of the laboratory where the activity will take place	Before activity takes place

COURSE CREDIT RECOGNITION PROCEDURE

The number of credits assigned for course attendance depends on the number of hours of the course according to the following table.

Hours/course	CFU (credits)
< 40	3
≥40 * (approval by the Executive Committee)	Max 6 * (of which 3 for freely chosen course)

* The attendance of courses longer than 40 hours must be previously approved by the Executive Committee. From the exceeding credits no more than 3 credits can be recognized and they will be recognized as freely chosen courses. The maximum number of credits that can be recognized for attending a course is 6.

All credits are acquired upon approval by the PhD student's advisor and tutor.

Courses that have contributed to other degrees and online courses that the student has completed do not apply.

HOW TO GET THE COURSE CREDITS RECOGNIZED

In order to insert the completed credits in the student's career, PhD students should ask the Secretariat of the Doctorate programme or the Institution that offers the course to send confirmation of the participation in the course as well as the outcome of the exam if foreseen to industrial-innovation@unitn.it

➢ **Technological/Scientific (TS) and Soft Skills/Innovation/Entrepreneurship/Economics/Management (SKIEEM) courses**
Any course chosen from the list provided in Annex A will be automatically approved.

➢ **Freely chosen courses**
- Any course chosen from the list provided in Annex A will be automatically approved.
- In case of courses that do not appear in Annex A, students must provide all related information (title, number of hours, lecturer, content, institute that provides the course) for approval by the Executive Committee.

➢ **School of Innovation (UNITN) courses**
PhD students interested in the recognition of 3 credits from the attendance of courses of the School of Innovation, must complete three courses (6 hours each course) or two courses (6 + 12 hours each course) of the School.

ADMISSION TO THE SUBSEQUENT YEARS

Admission to the subsequent year is approved by the Doctoral School Committee in October each year.

ADMISSION TO THE SECOND YEAR

By the end of the first year PhD students must fulfil the following requirements:

a. approval to the subsequent year by the academic advisor and industrial tutor
b. completion of at least 12 course credits
c. approval of "Research Plan"

Instructions and deadlines regarding the approval of the "Research Plan" are described in Annex B.

ADMISSION TO THE THIRD YEAR

By the end of the second year PhD students must fulfil the following requirements:

a. approval to the subsequent year by the academic advisor and industrial tutor
b. completion of at least 21 course credits
c. approval of "Progress Report"

Instructions and deadlines regarding the approval of the "Progress Report" are described in Annex B.

ADMISSION TO THE FINAL EXAMINATION

Admission to the Final Examination requires:
a. satisfactory assessment by the academic advisor and industrial tutor;
b. completion of a period of research of at least 6 months in the company funding the scholarship;
c. completion of at least two indexed articles of industrial-scientific interest; patent(s) close to be approved can also be considered.
The **Final exam** consists of a defence of the thesis before a panel of renowned experts.

Annex A – DOCTORAL COURSES BY THE PHD IN INDUSTRIAL INNOVATION

> ### TECHNOLOGICAL/SCIENTIFIC (TS) COURSES

Courses offered by ICT International Doctoral School - DISI

Courses' description and scheduling (and changes) are available within each course's webpage from:
https://ict.unitn.it/enrolled-student/courses
PhD students will attend the doctoral courses remotely.

Course	Course hours	Lecturer
Research Methodology *(mandatory)*	25	Carlo Ghezzi
Answer Set Programming for Knowledge Representation	20	Loris Bozzato
Computing in Communication Networks	20	Fabrizio Granelli, Frank Fitzek
Deep models for Spoken Language Translation	20	Marco Turchi
Digital Forensics and Computer Crimes	20	Antonio Barili
Geometric Computer Vision: from Images to 3D Models	20	Federica Arrigoni, Luca Magri
Metamaterials and Metasurfaces	20	Andrea Alù
Modern Weather Radar Technology and Systems	20	Jeffrey Herd
Requirements Engineering	20	Anna Perini, Angelo Susi
Security and privacy in socio-technical systems	20	Mattia Salnitri
Surface Electromagnetics	20	Fan Yang
Virtual EM Scenarios Generation for Modern Radar Testing [provisional title]	20	Alan J. Fenn

Courses offered by Doctoral Programme in Materials, Mechatronics and Systems Engineering – DII

IMPORTANT NOTES:
1. **all courses listed below with duration of 12 hours have to be integrated with a project activity of at least 6 hours. For such purpose, students have to arrange the project with the course's lecturer;**
2. **the combination of two short courses (12 hours each) may be considered as well in order to get 3 credits recognized.**

Courses' description and scheduling are available at https://www.unitn.it/drmmse/23/teaching-activities
All details (and changes) regarding the timetable and rooms will be published on the website at the following page:
http://www.unitn.it/en/drmmse

Course	Course hours	Lecturer
Materials Science and Engineering		
Applied electrochemistry	12	Michele Fedel

Biodesign applied to tissue engineering	12	Antonella Motta
Coatings for corrosion protection and electrochemical surface characterization	18 (+18 lab)	Flavio Deflorian, Stefano Rossi
Computational thermodynamics I	12	Massimo Pellizzari
Electron microscopy techniques – Theory	12	Stefano Gialanella
Electron microscopy techniques – Practice	12	Gloria Ischia
Elemental analysis by X-ray spectroscopy – Theory	12	Giancarlo Pepponi
Elemental analysis by X-ray spectroscopy – Practice	12	Lorena Maines, Mauro Bortolotti
Experimental mechanics of materials	18	Alessandro Pegoretti, Vincenzo Sglavo
Materials science and technology	18	Stefano Gialanella
Qualification SEM and TEM	12	GIoria Ischia, Lorena Maines, Antonella Motta
Thermal analysis	12 (+12 lab)	Luca Fambri, Massimo Pellizzari
X-ray diffraction: theory and applications to materials science and engineering	12 (+12 lab)	Luca Lutterotti, Mauro Bortolotti

Mechatronics and Mechanical Systems		
Introduction to systems biology	18	Giulia Giordano
Non-linear vibrations	12	Daniele Bortoluzzi
Optimization-Based robot control	12	Andrea Del Prete
Non-linear hybrid dynamical systems	18	Luca Zaccarian
Scientific computing	18 (+18 lab)	Enrico Bertolazzi

Electronic Systems and Integrated Microelectronic Systems		
Fundamentals of statistical estimation theory	18	Daniele Fontanelli
Measurement methodology and electronic instrumentation	18	Dario Petri

Operational Research		
Decision-Making under Certainty, Risk and Uncertainty	12	Bice Cavallo
Industrial planning for production systems	12	Francesco Pilati
Linear and non-linear optimization	18	Matteo Brunelli, Michele Fedrizzi
Project management	18	Alberto Molinari
Web strategy	12	Luisa Mich

Multidisciplinary Research Tools and Languages		
Virtual instruments for data acquisition and signal analysis	18	David Macii

In addition, during the academic year 2020/2021 the following courses will be offered by visiting professors at the Department of Industrial Engineering:

Electron microscopy and micromechanical properties of polymers	12	Miroslav Slouf
Lyapunov methods for the robustness of control systems	18	Franco Blanchini

Courses offered by Doctoral Programme in Civil, Environmental and Mechanical Engineering – DICAM

IMPORTANT NOTE: for all courses listed below with duration longer than 40 hours, please refer to the rule described in pag. 2.

Courses' description and scheduling (and changes) are available at: https://www.unitn.it/dricam/744/academic-year-2020-2021
PhD students will attend the doctoral courses remotely.

Course	Course hours	Lecturer
The City and the Futures. Perspectives and Experiences for Resilient Communities	24	Sara Favargiotti - Rocco Scolozzi
2nd Training Winter School – ITN INSPIRE	18	Oreste S. Bursi – Davide Bigoni - Francesco Dal Corso & others
Models and Applications for Transportation Systems Analysis	18	Andrea Pompigna
Environmental Sustainability	36	Gianni Andreottola – Marco Ragazzi – Marco Schiavon
Winterschool part I - Advanced numerical methods for free surface and subsurface flows *	30	Vincenzo Casulli
Winterschool part II - Advanced numerical methods for hyperbolic conservation laws *	40	Michael Dumbser - Saray Busto Ulloa
Mathematical Methods for Engineering	50	Alberto Valli - Ana Alonso Rodriguez
Advanced Thermodynamics	18	Claudio Della Volpe
Nonlinear Solid Mechanics	30	Luca Deseri
Environmental data management and analysis with GIS	40	Paolo Zatelli - Alfonso Vitti - Marco Ciolli
Statistical methods and data analysis	36	Stefano Siboni
X-ray Diffraction applied to the study of polycrystalline materials: theory and practice	36	Paolo Scardi
Molecular Dynamics: a primer with elements of statistical mechanics*	36	Paolo Scardi
Remote sensing and advanced geomatics for environmental applications *	20	Alfonso Vitti

Courses offered by Doctoral Programme in Physics

IMPORTANT NOTE: for all courses listed below with duration longer than 40 hours, please refer to the rule described in pag. 2.

Courses' description and scheduling are available at: https://www.unitn.it/drphys/en/129/training-programme

Course	Course hours	Lecturer
Advanced techniques in experimental physics	21	G. Baldi**
Optical and spectroscopic diagnostic of materials for photonics	21	A. Chiasera
Integrated classical and quantum photonics	21	L. Pavesi
Fundamental interactions (part of the lm course)	21	R. Iuppa, G. A. Prodi
Advanced interferometry	21	A. Perreca
Quantum sensing	21	A. Quaranta
Space-based observation techniques and methods	42	R. Battiston, L. Bruzzone, S. Vitale
Entanglement in many-body systems: from concepts to algorithms	21	M. Rizzi
The geometry of quantum algorithms	21	F. Holweck
Nuclear astrophysics of compact binary mergers: a multimessenger perspective	21	A. Perego
To be defined	45	TALENT (Training In Advanced Low-Energy Nuclear Physics)
ECT* (European Centre for theoretical Studies in Nuclear Physics and related Areas)	ECT* DOCTORAL TRAINING PROGRAMME 2020	
SISSA (Scuola Internazionale Superiore di Studi Avanzati)	TO BE DEFINED	

Courses offered by Doctoral Programme in Biomolecular Sciences

IMPORTANT NOTES:
1. **all courses listed below with duration of 12 hours have to be integrated with a project activity of at least 6 hours. For such purpose, students have to arrange the project with the course's lecturer;**
2. **the combination of two short courses (summing up at least 18 hours) may be considered as well in order to get 3 credits recognized.**

Courses' description and scheduling are available at: https://www.unitn.it/drbs/36/teaching-activities

Course	Course hours	Lecturer
Laboratory Safety Course	12	Prof. Alessandro Provenzani and Ines Mancini
Laboratory Techniques	6	Various
Scientific Publishing & Communication	12	Marie-Laure Baudet Massimo Pizzato Martin M. Hanczyc

BIOMOLECULAR CURRICULUM		
Course	Course hours	Lecturer
Biostatistics Module 1	6	Claudio Agostinelli
Module 2	12	

Course	Course hours	Lecturer
Bioinformatics Module 1: Machine learning techniques for classification and regression tasks in bioinformatics	8	Prof. Enrico Blanzieri
Module 2: Artificial intelligence techniques for the analysis and interpretation of single cell and spatial sequencing data	12	Toma Tebaldi
Molecular Spectroscopic Techniques	12	Graziano Guella
RNA Molecular Biology and Biotechnology	12	Michela A. Denti
Introduction to metagenomics	12	Nicola Segata
Chemical modifications and organic synthesis of biomolecules	12	Ines Mancini
Origins of Life	12	Sheref S. Mansy
Getting started with R and RStudio: a hands-on introduction	12	Pietro Franceschi
Data Exploration	12	Pietro Franceschi
Applied Statistics for High-Throughput Biology	12	Levi Waldron
Developmental Biology. Mini series of talks	12	Marie-Laure Baudet Paola Bellosta Yuri Bozzi Matthias Carl Simona Casarosa Lucia Poggi
Genomic and proteomic biomarkers: from target discovery to drug development applications	12	Enrico Domenici
Exploring gene evolution using phylogenetics and phylogenomics	12	Omar Rota- Stabelli
Exploring Biodiversity using DNA-barcoding and molecular clocks.	12	Omar Rota- Stabelli
Using ancient DNA to illuminate the evolutionary history of human infectious diseases	12	Maixner Frank
Advanced imaging approaches in Biomedicine	12	Alessio Zippo
Neural Stem cell	12	Luciano Conti
Epigenetics mechanisms and their role during Cell Differentiation and transformation, Metabolism, Neuronal diseases	12+6	Marta Biagioli Fulvio Chiacchiera
Regenerative medicine and Artificial Intelligence applications to biomedicine	12	Paola Bellosta, Martin Hanczyc, Alessandro Romanel, Luciano Conti Antonella Motta Nicola Pugno

BIO - INDUSTRY CURRICULUM		
Course	Course hours	Lecturer
Managing Pharma: from Idea to the Market Module 1: Managing Innovation in Pharma R&D	12+12	Lucio Da Ros
Module 2: From Clinical research into the market		Alessandro Provenzani

Entrepreneurial Basic Skills for Biotech Module 1: From innovation to a business model	12	Alberto Nucciarelli
Moldue2: Working on a business plan	12	Stefano Milani
Preclinical research and clinical development programs of drugs	12	Borlak Jürgen

> ➢ **SOFT SKILLS/INNOVATION/ENTREPRENEURSHIP/ECONOMICS/MANAGEMENT (SKIEEM) COURSES**

From research to business: a technology transfer approach (HIT course) (*mandatory*)
From 22nd to 26th February.   The complete course scheduling will be available soon

Courses offered by UNITN

Course	Course hours	Description
Academic Writing for the Sciences and Engineerings	24	https://ict.unitn.it/node/756
Crash Course on Research Funding, Intellectual Property and Start up Creation	20	https://event.unitn.it/crashcourse/

Courses offered by Doctoral Programme in Economics and Management – DEM

IMPORTANT NOTE: for all courses listed below with duration longer than 40 hours, please refer to the rule described in pag. 2.

Courses' information at https://www.unitn.it/drss/em/221/curriculum
Courses' scheduling (and changes) is available at: https://www.unitn.it/drss/em/222/schedule-and-course-materials
PhD students will attend the doctoral courses remotely.

Course	Course hours	Lecturer
Advanced Econometrics	24	Carlo Fezzi
Applied Microeconometrics*	18	Steven Stillman
Behavioural Economics	48	Luigi Mittone
Experimental Economics	25	Matteo Ploner
Game Theory	48	Luciano Andreozzi
Managerial decision making	36	Fabio Zona
Performance analysis and business analytics	25	Enrico Zaninotto
Statistics and Regression	36	Emanuele Taufer
Time Series*	30	Francesca Marta Lilja Di Lascio, Francesca Ravazzolo

* courses in cooperation with the Free University of Bolzano - Bozen (UNIBZ). PhD Students interested in these courses need to contact the Secretariat of the Doctoral Programme in Economics and Management – DEM - school.socialsciences@unitn.it

School of Innovation
For the recognition of 3 credits, three courses (6 hours each course) or two courses (6 + 12 hours each course) must be completed.

Courses' description and scheduling are available within each course's webpage from: http://www.soi.unitn.it/school-of-innovation-courses-program/

Course	Course hours	Lecturer
An introduction to FinTech: from mobile payments to blockchains	12	Fabio Massacci, Galena Pisoni
Basics of management	6	Andrea Bolner
Brand Development and Psychology of Marketing	6	Cveta Majtanovic
Business models-Value Proposition Canvas VPC & Business Model Canvas BMC	12	Andrea Bolner
Business plan	6	Stefano Milani
Cognitive Sociology of Science: Studying social conversations about science	6	Giuseppe Alessandro Veltri
Decision making for strategic innovation	6	Alberto Nucciarelli
Ethics and Law of Artificial Intelligence	6	Carlo Casonato
From product to business model innovation	6	Alberto Nucciarelli
Fundamentals of quality engineering	6	Dario Petri
Go to market	12	Andrea Bolner
How to be a better speaker: Golden rules for presenting your work with style	6	Cristina Rigutto
IE: International Alliances	12	VittorinoFilippas
IE: Ramp up your Business	12	Vittorino Filippas
IE:Multicultural Negotiation	12	Vittorino Filippas
Industrial Innovation in Communications, Radars and Sensing Systems	6	Andrea Massa, Giacomo Oliveri, Paolo Rocca
Information and knowledge management in organization	6	Roberta Cuel
Innovation processes and the new production of users	6	Enrico Attila Bruni
Intellectual property rights	6	Paolo Guarda
International Entrepreneurship: From Idea to business idea	12	Vittorino Filippas
Operations research for decision making	6	Matteo Brunelli
Organizing for novelty, creativity and innovation	6	Maria Laura Frigotto
Personal branding	6	Andrea Bolner
Technology Entrepreneurship	6	Mehrdad Nikoonahad
The drug discovery process and the role of biomarkers in achieving personalized medicine	6	Enrico Domenici
The Social Powers of Algorithms - Bright and Dark Sides	6	Alberto Montresor
Theater teaches innovation	12	Mariasole Bannò

Seminars

Course	Course hours
Economia circolare e rifiuti elettronici	12
That's my life	6

EIT courses

For EIT students all course listed below will be automatically inserted in their career.
- Research to Value
- Business Modelling
- Business Development
- Business Growth
- Business Change

The courses' scheduling will be provided soon.

Annex B – RESEARCH PLAN AND PROGRESS REPORT

RESEARCH PLAN

By the end of June PhD students submit a **research plan** (maximum 5 pages) which outlines the research activities they will carry out during the 3-year PhD programme and which must be approved by both the academic advisor and the industrial tutor.

By the end of July the plan must be approved by an evaluation committee.

In case of:

- positive assessment by the academic advisor and the industrial tutor, and negative assessment by the evaluation committee: a revised version of the research plan must be submitted by the PhD student to the committee in 30 days (and no later than the end of August).
  The committee makes a new assessment by mid - September.
  If the assessment is positive, the research plan is approved.
  If the assessment is negative, the Executive Committee decides whether to approve or not the plan. In the latter case, the PhD student is excluded from the PhD programme;

- negative assessment by the academic advisor and the industrial tutor, and positive assessment by the evaluation committee: the Executive Committee decides whether to approve or not the plan.
  If the Executive Committee does not approve the plan the PhD is excluded from the PhD programme;

- negative assessment by the academic advisor, the industrial tutor and the evaluation committee: the PhD student is excluded from the PhD programme.

PROGRESS REPORT

By the end of June PhD students submit a **progress report** (approximately 10-pages) which should include the state of progress of the research, the plan of the remaining research activities, the list of publications or the plan to achieve them. The report must be approved by both the academic advisor and the industrial tutor.

By the end of July the report must be approved by an evaluation committee of three professors*.

In case of:

- positive assessment by the academic advisor and the industrial tutor, and negative assessment by the evaluation committee: a revised version of the progress report must be submitted by the PhD student to the committee in 30 days (and no later than the end of August).
  The committee makes a new assessment by mid-September.
  If the assessment is positive, the progress report is approved.
  If the assessment is negative, the Executive Committee decides whether to approve or not the report. In the latter case, the PhD student is excluded from the PhD programme;

- negative assessment by the academic advisor and the industrial tutor, and positive assessment by the evaluation committee: the Executive Committee decides whether to approve or not the report.
  If the Executive Committee does not approve the report the PhD student is excluded from the PhD programme;

- negative assessment by the academic advisor, the industrial tutor and the evaluation committee: the PhD student is excluded from the PhD programme.