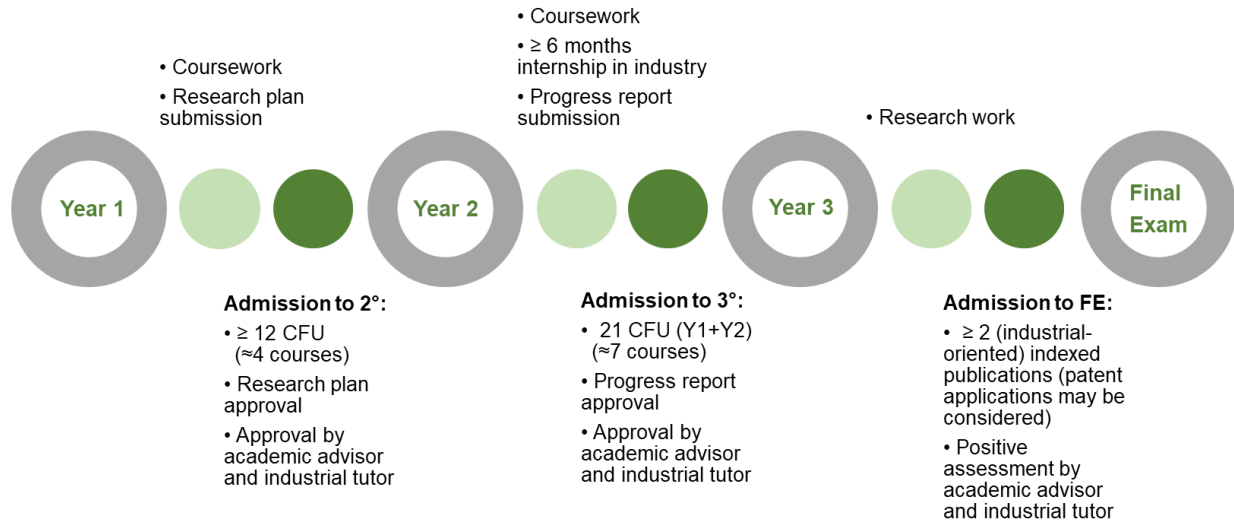


MANIFESTO OF STUDIES 2021-2022

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 - 2021/2022 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: <ul style="list-style-type: none"> • 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 TS courses	9	2 TS Courses	6
2 SKIEEM courses	6	3 SKIEMM courses	9
2 FS courses	6	2 FS courses	6
Credits	21	Credits	21

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

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).

ENROLMENT ON COURSES

Courses offered by	How to enrol
IECS Doctoral School – DISI HIT	Your enrolment is automatic if the course has been inserted in DSC
Doctoral Programme in Materials, Mechatronics and Systems Engineering – DII	Contact dii.phd@unitn.it
Doctoral Programme in Civil, Environmental and Mechanical Engineering – DICAM	Contact dicamphd@unitn.it
Doctoral Programme in Physics	Contact phd.physics@unitn.it
Doctoral Programme in Biomolecular Sciences – CIBIO	Contact phd.bioscie@unitn.it
Doctoral Programme in Economics and Management – DEM	Contact school.socialsciences@unitn.it
School of Innovation	Contact soi-info@unitn.it

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	Due
Italian Language (A1) Only for foreign students	CLA	https://www.cla.unitn.it/en/671/italian-for-foreigners	End of the 2° year
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.	April, 30 of the 1° year
Health and Safety in the workplace – Low risk Training	UNITN E-Learning	Online course The course is available with the university credentials in the website of Didattica online.	April, 30 of the 1° year

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

Training by the Lab/ Company responsible	UNITN Company	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 the activity takes place
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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.

The minimum number of hours to get 3 credits is 18.

Hours/course	CFU (credits)
<18	0
>18 and <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 program 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.

Some courses have a duration of less than 18 hours. In that case, an integration with a project activity or the combination of short courses are required.

- **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, by sending an e-mail to industrial-innovation@unitn.it with academic advisor and industrial tutor in cc.

Summer/Winter Schools of at least 18 hours can be recognized as freely chosen courses.

- **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. positive assessment 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. positive assessment 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. positive 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 ISI- or SCOPUS- indexed articles of industrial-scientific interest*;
patent(s) close to be approved can also be considered.
*the articles should be at least approved for publication

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 [IECS Doctoral School](#) - DISI

Courses' description and scheduling (and changes) are available within each course's webpage at:
<https://iecs.unitn.it/education/courses>

Course title	Hours	Lecturer
Research methodology (mandatory)	20	Carlo Ghezzi
Machine learning for wireless networks	20	Marco Levorato
Towards brain programming	20	Adrano Tavares, Fausto Giunchiglia
AI ethics today	20	James Brusseau
Advanced C++ programming	20	Giuseppe Lipari
Computing in Communication Networks	20	Frank Fitzek, Fabrizio Granelli
Multimodal machine learning	20	Wei Wang, Cigdem Beyan
Bringing Perception to Social Robots: An introductory course	20	Paolo Rota, Yiming Wang
Security and privacy in socio-technical systems	20	Mattia Salniti
Network intrusion detection with Deep Learning	20	Roberto Doriguzzi Corin
Rare event simulations for safety and security of software	20	Carlos Budde
Introduction to SAT and SMT	20	Roberto Sebastiani
Advanced digital forensics	20	Antonio Barili
Deep Models for Spoken Language Translation	20	Marco Turchi, Marcello Federico
Digital identity: enrollment, authentication, and all that	20	Roberto Carbone, Silvio Ranise, Giada Sciarretta
Answer Set Programming in Knowledge Representation	20	Loris Bozzato

Courses offered by [Doctoral Programme in Materials, Mechatronics and Systems Engineering](#) – DII

IMPORTANT NOTES:

- all courses listed below with duration of <18 hours have to be integrated with a project activity to reach 18 hours. For such purpose, students have to arrange the project with the course's lecturer;
- 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/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 title	Hours	Lecturer
Materials Science and Engineering		
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 II	12	Massimo Pellizzari
Electron microscopy techniques – Theory	12	Stefano Gialanella
Electron microscopy techniques – Practice	12	Gloria Ischia
Elemental analysis by X-ray spectroscopy – Practice*	12	Mauro Bortolotti, Lorena Maines
Environmental sustainability of the materials	12	Andrea Dorigato
Friction and Wear of Materials	18	Giovanni Straffelini
Materials science and technology	18	Luca Fambri
Qualification SEM and TEM*	12	Gloria 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		
Neural networks for Mechanics	18	Gastone Pietro Rosati Papini
Non-linear vibrations*	12	Daniele Bortoluzzi
Object oriented modeling and simulation of multi-physics dynamical systems	18 (+6 lab)	Francesco Biral
Scientific computing	18 (+18 lab)	Enrico Bertolazzi
Saturated control systems	18	Luca Zaccarian
* Courses offered on demand (contact dii.phd@unitn.it)		
Electronic Systems and Integrated Microelectronic Systems		
Designing and programming the Internet of Things (IoT)	18	Davide Brunelli
Image sensors	18	Lucio Pancheri
Laboratory of electronic instrumentation	18	David Macii
Silicon radiation detectors	18	Gian-Franco Dalla Betta
The electrification behind the green revolution	18	Elisabetta Tedeschi
Operational Research		
Basics of reliability engineering	12	Matteo Brunelli
Linear and non-linear optimization	18	Matteo Brunelli, Michele Fedrizzi
Project management	18	Andrea Molinari
Multidisciplinary Research Tools and Languages		
Virtual instruments for data acquisition and signal analysis	18	David Macii

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

IMPORTANT NOTE:

- all courses listed below with duration of <18 hours have to be integrated with a project activity to reach 18 hours. For such purpose, students have to arrange the project with the course's lecturer;
- 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 (and changes) are available at:
<https://www.unitn.it/dricam/913/academic-year-2021-2022>

Course title	Hours	Lecturer
Molecular Dynamics: a primer with elements of statistical mechanics*	16	Paolo Scardi
The City and the Futures. Perspectives and Experiences for Resilient Communities	24	Sara Favargiotti, Rocco Scolozzi (Department of Sociology and social research)
GEOframe Winter School GWS2022 *	48	Riccardo Rigon, Giuseppe Formetta
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, Firas Dhaouadi
Mathematical Methods for Engineering - theoretical part	34	Alberto Valli, Ana Alonso Rodriguez
Understanding turbulence dynamics by simulations and measurements*	32	Michael Dumbser, Luigi Fraccarollo, Lorenzo Giovannini, Sebastiano Piccolroaz, Marco Toffolon, Nadia Vendrame, Dino Zardi
Steel design for seismic and gravity loads	24	Colin Rogers (McGill University - Canada)
Introductory nonlinear mechanics of soft biological tissues*	33	Luca Deseri, Angelo R. Carotenuto (University of Napoli-Federico II)
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
Models and Applications for Transportation Systems Analysis	18	Andrea Pompigna (Engineer, Assistant Freelancer)
Advanced geomatics and remote sensing for environmental applications*	20	Alfonso Vitti
Integrated river ecomorphodynamics	32	Guido Zolezzi, Walter Bertoldi, Annunziato Siviglia
Hydro Climatology and Paleohydrology	30	Glenn Tootle (University of Alabama), Giuseppe Formetta
Numerical Modelling of Weather and Climate*	54	Simona Bordoni, Andrea Bisignano, Lorenzo Giovannini, Dino Zardi
Modelling and simulation of integrated river ecomorphodynamics*	32	Walter Bertoldi, Annunziato Siviglia, Marco Toffolon, Guido Zolezzi

* Courses of the Honours Programme "Modelling & Simulation": all courses of the Honour Programme "Modelling & Simulation" are part of the educational offer a.y. 2021-2022

Courses offered by [Doctoral Programme in Physics](#)

IMPORTANT NOTE: for all courses listed below with duration longer than 40 hours, please refer to the course credit recognition rules.

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

Course title	Hours	Lecturer
Advanced techniques in experimental physics	21	G. Baldi, R.S. Brusa** (Coordinatori)
Optical and spectroscopic diagnostic of materials for photonics	21	A. Chiasera
Advanced interferometry	21	A. Perreca
Quantum sensing	21	A. Quaranta
Space-based observation techniques and methods	42	R. Battiston, L. Bruzzone, S. Vitale
Multiscale modeling: from the atom to the cell	21	M. Calandra, F. Pederiva, R. Potestio
Gaussian states and quantum machine learning	24	C. Conti
Entanglement in many-body systems: from concepts to algorithms	21	M. Rizzi
Bell nonlocality, from foundations to applications	21	V. Scarani
An introduction to quantum-information thermodynamics	21	M. Lostaglio
Radiation chemistry	21	E. Scifoni
To be defined	45	TALENT (Training In Advanced Low-Energy Nuclear Physics)
ECT* doctoral training programme 2021: high energy and nuclear physics within quantum technologies		ECT* (European Centre For Theoretical Studies In Nuclear Physics And Related Areas)
https://www.isapp-schools.org/		ISAPP

*Additional credits to the mandatory ones

**Prof. Baldi will coordinate the course with the support of the professors of the experimental research Laboratories

Courses offered by [Doctoral Programme in Biomolecular Sciences - CIBIO](#)

IMPORTANT NOTES:

- all courses listed below with duration of <18 hours have to be integrated with a project activity to reach 18 hours. For such purpose, students have to arrange the project with the course's lecturer;
- 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 title	Hours	Lecturer
Biomolecular Curriculum		
Biostatistics - Module 1	8	Veronica Vinciotti
Biostatistics - Module 2	10	Veronica Vinciotti

Bioinformatics - Module 1	8	Enrico Blanzieri
Bioinformatics - Module 2	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
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, Alessandro Romanel, Luciano Conti, Flavia Ravelli, Antonella Motta, Nicola Pugno
Bio - Industry Curriculum		
Managing Pharma: from Idea to the Market Module 1: Managing Innovation in Pharma R&D	12	Lucio Da Ros
Managing Pharma: from Idea to the Market Module 2: From Clinical research into the market	12	Alessandro Provenzani
Entrepreneurial Basic Skills for Biotech Module 1: From innovation to a business model	12	Alberto Nucciarelli
Entrepreneurial Basic Skills for Biotech Module 2: 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

Courses offered by UNITN

Course title	Hours	Description
Academic Writing for the Sciences and Engineering	24	https://iecs.unitn.it/node/1209
Research and innovation seminars	20	https://event.unitn.it/ri-seminars/

Courses offered by [HIT – Hub Innovazione Trentino](#)

Course title	Hours	Period
From research to business: a technology transfer approach (mandatory)	25	February 14-18, 2022

Courses offered by [Doctoral Programme in Economics and Management – DEM](#)

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>

IMPORTANT NOTE:

- all courses listed below with duration of <18 hours have to be integrated with a project activity to reach 18 hours. For such purpose, students have to arrange the project with the course's lecturer;
- for all courses listed below with duration longer than 40 hours, please refer to the course credit recognition rules.

Course title	Hours	Lecturer
Statistics and Regression	36	Emanuele Taufer UNITN*
Behavioural Economics (joint course - master BEA)	48	Luigi Mittone
Game Theory (joint course - master BEA)	48	Luciano Andreozzi
Applied Microeconometrics (UNIBZ*)	18	Steven Stillman
Time Series (UNIBZ*)	30	Francesca Marta Lilja Di Lascio, Francesco Ravazzolo
Advanced Econometrics	24	Carlo Fezzi UNITN*
Experimental Economics: Data Workflow	16	Matteo Ploner
Managerial decision making	36	Fabio Zona
Performance analysis and business analytics (joint course - master BEA)	25	Enrico Zaninotto
Research Methodology	32	Fabrizio Costa, Maria Laura Frigotto
Questionnaire Design	18	Lucia Savadori

* courses in cooperation with the Free University of Bolzano - Bozen (UNIBZ).

Courses offered by [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 title	Hours	Lecturer
SEMESTER 1		
International Entrepreneurship – From idea to business idea	12	Vittorino Filippas
Data Science I – Introductory course	6	Sandro Fiore
The Challenge Action Plan	12	Roberto Napoli
Theater teaches innovation	18	Mariasole Bannò
That's my life	8	Alessandro Rossi
Fintech: disrupting the financial sector	6	Pablo Soler Bach
Data Science II – Advanced course	12	Sandro Fiore
Operations research for decision making	6	Matteo Brunelli
The drug discovery process and the role of biomarkers in achieving personalized medicine	6	Enrico Domenici
Innovation processes and the new production of users	6	Attila Bruni
Business models – Value Proposition Canvas VPC & Business Model Canvas BMC	12	Andrea Bolner
Organizing for novelty, creativity and innovation	6	Maria Laura Frigotto
Venture Capital Funding	6	Pablo Soler Back
Innovation Ecosystems	6	Alberto Nucciarelli
Negotiation Skills	18	Andrea Caputo
Teams and Team Working in Organizations	6	Stefano Cirella
Coop Mindset	18	Paolo Fontana
Principles of Marketing	6	Oksana Tokarchuk
Managing the New Product Development Process	12	Oksana Tokarchuk
SEMESTER 2 (subject to modifications)		
Intellectual Property Rights	6	Paolo Guarda
Personal Branding	6	Andrea Bolner
Business Plan	6	Stefano Milani
How to be a better speaker: Golden rules for presenting your work with style	6	Cristina Rigutto
Data Science I – Introductory course	6	Sandro Fiore
Basics of Management	6	Erica Santini
From product to business model innovation	6	Alberto Nucciarelli
That's my life	8	Alessandro Rossi

Industrial innovation in communications, radars and sensing systems	6	Andrea Massa, Giacomo Oliveri, Paolo Rocca
An introduction to FinTech: blockchains and all that	12	Fabio Massacci, Galena Pisoni
Business Analytics	12	Sandro Fiore
Fundamentals of Quality Engineering	6	Dario Petri
Understanding Megatrends	6	Roberto Poli
Brand Development and Psychology of Marketing	6	Cveta Majtanovic
Circular economy	6	Micol Chiesa
Learning processes and technological innovation	12	Erica Santini
Project Implementation	6	Roberto Napoli
Creativity and Collective Creativity in Organizations	12	Stefano Cirella
Ethics and Law of Artificial Intelligence	6	Carlo Casonato
Leadership: theory and case studies	6	Paolo Carta
Strategy making	6	Andrea Caputo
Social Impact Investing	6	Pablo Soler Bach
Go to market	12	Andrea Bolner
Product Design	6	Stefano Rossi

EIT courses

For EIT students (cycles 35 and 36) all courses listed below are automatically inserted in their career.

- Research to Value
- Business Modelling
- Business Development
- Business Growth
- Business Change

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 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.

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.