PhD Course in
Sciences, Technologies and Measurements for Space - STMS

University of Padua - Italy

PhD Course Specifications and Program for the 40th cycle
(updated on 28 March 2024)

Foreword

This Document describes the STMS PhD Course composition, activities, structure and resources foreseen for the 40th cycle starting on 1st November 2024.

This Document is yearly updated by the PhD Course Board. It serves as a guide to facilitate professors and doctoral students during the PhD period. Its content is meant to be applied without rigidity, with the only requirement to fully satisfy the main goals of the PhD Course, namely to provide excellence in education and formation. Variations to what here written are possible under acceptance of the PhD Course Board, always staying within the limitations foreseen by the Academy and PhD Course Rules.

Doctoral students follow the indications given in the Document corresponding to the year of enrollment, unless differently stated by the STMS PhD Course Board.

Contents

1 STMS PhD Course Rationale

Description of the project:
The space sector appears to be one of the most multidisciplinary. Almost all "terrestrial" disciplines have a spatial counterpart with specific peculiarities of such a particular environment. The doctoral course in Sciences, Technologies and Measurements for Space (STMS) aims to train researchers who can operate in this sector with a highly multi-disciplinary preparation that combines typical skills of Engineering and Sciences. This aspect, which represents the strong point and peculiarity of this course, is essential for space missions where the most important scientific results are often obtained with instruments and devices that represent the state of the art of engineering. Such a multidisciplinary approach is offered through a heterogeneous college composition with teachers from both fields. This peculiarity is not usually offered in other doctoral courses, which, being administered either by Engineering or Astronomical Sciences Departments, provide more focused preparation in only one of the two fields. In particular, the teaching staff offers numerous transversal courses and seminars in order to train a research doctor with the required multidisciplinary skills.

Course objectives:
The aim of the Doctoral Course in Sciences, Technologies and Measurements for Space (STMS) is the training of PhDs capable of carrying out research activities in disciplines related to science, technologies and measurements for space. The Course, established in a University Center (CISAS), has a very heterogeneous teaching staff made up of Science and Engineering professors, which offers an extremely multidisciplinary environment. This path is not usually offered in aerospace engineering or astronomy doctorates, which focus on a single topic. Students often operate within national or international programs, actively participating in theoretical, technological, computational or experimental activities within space research. The educational path allows you to acquire skills that can be best used both in the perspective of a university career and a position in research institutes or in high-tech industrial sectors. The training of the Course and the various contacts with industries in the sector can also stimulate future doctoral students to compete in the broader national and international scenario, or to promote the growth of high-tech spin-offs and the innovation of the local industry with important territorial implications. The multidisciplinary approach, at the basis of the training of PhDs in STMS, enables them to manage scientific and/or industrial research programs at leadership levels.

Expected employment and professional opportunities
The professional placement of PhDs in Sciences, Technologies and Measurements for Space is distinct between the two existing curricula. The indications given refer to the information available, generally relating to the first three years after obtaining the qualification.
The usual types of professional placement for PhDs of the "Mechanical Measurements for Engineering and Space" (MMES) curriculum are mainly those relating to the design, construction and qualification of instruments for the measurement and analysis of mechanical and thermal quantities, which find a professional placement both in the industrial sector and in that of research structures. In the field of applied research, the skills of the PhD in MMES are required in high-tech industries relating to mechanical, thermal and optomechanical instrumentation, and in IT services companies, with particular regard to the aerospace sector.
Research Doctorates in the "Sciences and Technologies for Aeronautics and Satellite Applications" (STASA) curriculum usually find professional placements in the academic field, in the aerospace industry, in Space Agencies (national or foreign) and associated laboratories, in the INAF Astronomical Observatories, in research institutions, companies in the high technology field, university spin-offs, in foreign laboratories or in the start-up of (or participation in) small advanced technology companies.

2 Involved institutions

The reference University Institution for the STMS PhD Course is the Center of Studies and Activities for Space (in Italian "Centro di Ateneo di Studi e Attività Spaziali", hereafter CISAS) "Giuseppe Colombo", for administration.

The University Departments involved in the STMS PhD Course are:
University of Padova:
Civil and Environmental Engineering, Industrial Engineering, Information Engineering, Mathematics, Physics and Astronomy, Political Science, Law and International Studies.

From other Italian Universities:
Engineering (University of Perugia), Engineering (University of Sannio)

From foreign Universities:
Physikalisches Institut (Universität Bern), Institut PPRIME, DPMM-ED, CNRS, Poitiers – France (Université de Poitiers and Ecole Nationale Supérieure de Mécanique et Aérotechnique - ENSMA), Unitat de Física de les Radiacions (Universitat Autònoma de Barcelona), Department of Mechanics and Maritime Sciences (Chalmers University of Technology), National Center for Supercomputing Applications, Nuclear Plasma and Radiological Engineering Department, Department of Aerospace Engineering, Department of Mechanical Science and Engineering (University of Illinois at Urbana-Champaign).

Other Institutions involved in the STMS PhD Course are:
CNR Institute of Photonics and Nanotechnologies, Padova; INAF Padova Observatory

For any information relative to the STMS PhD Course, the reference people are Prof. Francesco Picano (Coordinator, francesco.picano@unipd.it) (in charge from October 2023), Prof. Riccardo Rando (Deputy Coordinator, riccardo.rando@unipd.it) (in charge from October 2023), Novella Cesaro (PhD Secretary, novella.cesaro@unipd.it), Valentina Ciprian (valentina.ciprian@unipd.it) and Luciana Cecchinato (Administration Secretary, luciana.cecchinato@unipd.it).
Since 2023 the Mediatrice/Mediatore del Corso di Dottorato has been instituted. She/He can hear doctoral students who are facing problems. The contacts are the following:
- Prof. Maria Guglielmina Pelizzo (mariaguglielmina.pelizzo@unipd.it);
- Dr. Andrea Valmorbida (andrea.valmorbida@unipd.it).

Course address:
Corso di Dottorato in "Sciences, Technologies and Measurements for Space (STMS)"
c/o Centro di Ateneo di Studi e Attività Spaziali "Giuseppe Colombo"
Via Venezia 15
I-35131 Padova - Italy
http://cisas.unipd.it/phd-course-dottorato/phd-course
email: **dottorato.cisas@unipd.it**

2.1 National and International Agreements

Since December 2010 the STMS PhD Course is included in the international network IDPASC (International Doctorate Network in Particle Physics, Astrophysics and Cosmology, http://www.idpasc.lip.pt/
Since February 2021 the STMS PhD course is part of the Italian national network of PhD schools in the Aerospace sector promoted by the AIDAA (Associazione Italiana di Aeronautica e Astronautica).

3 Academic Disciplines and Scientific Areas

The academic disciplines relevant for the STMS PhD Course are (University Ministry codes):

FIS/01: Experimental Physics
FIS/03: Matter Physics
FIS/05: Astronomy and Astrophysics
ICAR/01 Hydraulics
ICAR/08: Structural mechanics
ING-IND/03: Flight Dynamics
ING-IND/04: Aerospace Constructions and Structures
ING-IND/05: Aerospace Plants and Systems
ING-IND/06: Fluid dynamics
ING-IND/07: Aerospace Propulsion
ING-IND/12: Mechanical and Thermal Measurements
ING-INF/04: Automatics
ING-INF/07: Electrical and Electronics Measurements
MAT/07: Mathematical Physics
SPS/06: History of international relations

The main scientific area relevant for the STMS PhD Course is (University codes):

10: Industrial Engineering

Other scientific areas of interest for the Course are:

1: Mathematical Sciences
2: Physical Sciences
5: Earth Sciences
11: Information Technologies
17: Psychological Sciences

4 Curricula and Fields of Expertise

In order to provide not only a broad, interdisciplinary vision, but also a specific competence in particular fields, two Curricula have been instituted in the STMS Course:

- Mechanical Measurements for Engineering and Space - MMES
- Sciences and Technologies for Aeronautics and Satellite Applications – STASA.

4.1 Fields of Expertise of the MMES Curriculum

- Analysis and definition of measuring methodologies and data processing
- Definition of methods to evaluate the uncertainty
- Design and setup for laboratory experiments simulating harsh environmental conditions
- Design and set up of measuring and testing devices for opto-mechanical and ultrasonic instrumentations
- Flight mechanics
- Functional analysis of instrumentation and representation through general theory
- Industrial installation and equipment testing with the design of optimal measuring system
- Innovative procedures for measuring by means of non-conventional methods
- Measurements of time variable phenomena with on-line data processing and industrial process monitoring
- Measuring techniques in clinical diagnostics
- Methods to validate interpretative models in industrial and clinical diagnostics
- Mechanical system testing; development, acceptance and qualification tests

4.2 Fields of Expertise of the STASA Curriculum

- Astrobiology, origins, early evolution, distribution, and future of life in the universe
- Advanced Robotics; Mechanisms and Tethers in Space
- Aerodynamics of Aerospace Systems, thermo-fluid dynamics and combustion
- Design, verification and test of laboratory simulation in harsh environment
- Dynamics of Space Flights and Attitude Control
- Fluid dynamics and hydraulics
- Interaction between Spacecraft and Space Environment
- Mission analysis for Universe and Earth Observations
- Observations and Exploration of Solar System and Universe
- Observation of Earth from Space
- Optics and Scientific Instruments for Space
- Photon Detectors from soft-X rays to near infrared
- Physics of Planets, Moons, Comets, Asteroids
- Propulsion systems
- Space Navigation
- System Engineering and Mission Analysis
- Structural and thermal analysis of Space Systems
- History of International Relations and Space Diplomacy

5 STMS PhD Course Governing Bodies

According to Art. 7 of the University Regulations for PhD Courses (in Italian, Regolamento di Ateneo per i Corsi di Dottorato di Ricerca), the following Course governing bodies have been instituted:

a) the Course Coordinator
b) the PhD Course Board ("Collegio docenti")

Their composition and capacities are specified by the University Regulations document and by the specific Course's Regulations (in Italian, Regolamento dei Corsi di Dottorato, Art. 7, 8, 9, 10, 11).

The present composition of the governing bodies is the following:

Coordinator: Prof. Francesco Picano
Deputy Coordinator: Prof. Riccardo Rando

PhD Course Board:

First name, Last name, Institution, e-mail	Curriculum	Title	SSD
Carlo Bettanini carlo.bettanini@unipd.it University of Padova, Dip. Ingegneria Industriale	MMES	Professor	ING-IND/03
Andrea Bottacin Busolin andrea.bottacinbusolin@unipd.it University of Padova, Dip. Ingegneria Industriale	STASA	Professor	ICAR/01
Francesco Branz francesco.branz@unipd.it University of Padova, Dip. Ingegneria Industriale	STASA	Researcher	ING-IND/05
David Burigana david.burigana@unipd.it University of Padova, Dip. Scienze Politiche, Giuridiche, Studi Internazionali	STASA	Professor	SPS/06
Giacomo Colombatti giacomo.colombatti@unipd.it University of Padova, Dip. Ingegneria Industriale	MMES	Researcher	ING-IND/03
Alain Jody Corso alain.corso@pd.ifn.cnr.it Padova CNR-IFN	STASA	Expert	(FIS/03)
Gabriele Cremonese gabriele.cremonese@oapd.inaf.it Padova, INAF OAPD	STASA	Expert	(FIS/05)
Davide Curreli dcurreli@illinois.edu University of Illinois at Urbana-Champaign, National Center for Supercomputing Applications, Nuclear Plasma and Radiological Engineering	STASA	Professor from a foreign University	(FIS/03)
Luca De Vito devito@unisannio.it University of Sannio Benevento, Dip. Ingegneria	MMES	Professor	ING-INF/07
Michele Doro michele.doro@unipd.it University of Padova, Dip. Fisica e Astronomia	STASA	Professor	FIS/01
Alessandro Francesconi alessandro.francesconi@unipd.it University of Padova, Dip. Ingegneria Industriale	STASA	Professor	ING-IND/05
Ugo Galvanetto ugo.galvanetto@unipd.it University of Padova, Dip. Ingegneria Industriale	STASA	Professor	ING-IND/04
Markus Gaug Markus.Gaug@uab.cat Universitat Autònoma de Barcelona, Unitat de Física de les Radiacions	STASA	Professor from a foreign University	(FIS/01)
Marco Gigliotti marco.gigliotti@unipi.it Università di Pisa	STASA	Professor	(IIND-01/D)

Enrico Lorenzini enrico.lorenzini@unipd.it	MMES	Expert / Senior scholar	ING-IND/12
Francesco Marzari francesco.marzari@unipd.it University of Padova, Dip. Fisica e Astronomia	STASA	Professor	FIS/05
Giampiero Naletto giampiero.naletto@unipd.it University of Padova, Dip. Fisica e Astronomia	STASA	Professor	FIS/01
Maurizio Pajola maurizio.pajola@inaf.it Padova, INAF OAPD	STASA	Expert	(FIS/05)
Francesco Panerai fpanerai@illinois.edu University of Illinois at Urbana-Champaign (USA), Department of Aerospace Engineering, Department of Mechanical Science and Engineering	MMES	Professor from a foreign University	(ING-IND/12)
Daniele Pavarin daniele.pavarin@unipd.it University of Padova, Dip. Ingegneria Industriale	MMES	Professor	ING-IND/07
Maria Guglielmina Pelizzo pelizzo@dei.unipd.it University of Padova, Dip. Ingegneria dell'Informazione	STASA	Professor	(FIS/03)
Marco Pertile marco.pertile@unipd.it University of Padova, Dip. Ingegneria Industriale	MMES	Professor	ING-IND/12
Francesco Picano francesco.picano@unipd.it University of Padova, Dip. Ingegneria Industriale	STASA	Professor	ING-IND/06
Riccardo Rando riccardo.rando@unipd.it University of Padova, Dip. Fisica e Astronomia	STASA	Professor	FIS/01
Gianluca Rossi gianluca@unipg.it University of Perugia, Dip. Ingegneria	MMES	Professor	ING-IND/12
Bortolino Saggin bortolino.saggin@unipd.it University of Padova, Dip. Ingegneria Industriale	MMES	Professor	ING-IND/12
Lorenzo Sanavia lorenzo.sanavia@unipd.it University of Padova, Dip. Ingegneria Civile Edile e Ambientale	STASA	Professor	ICAR/08
Gaetano Sardina sardina@chalmers.se Chalmers University of Technology, Department of Mechanics and Maritime Sciences	STASA	Professor from a foreign University	(ING-IND/06)
Nicolas Thomas nicolas.thomas@space.unibe.ch Universität Bern, Physikalisches Institut	STASA	Professor from a foreign University	(FIS/05)
Giuseppe Vallone giuseppe.vallone@unipd.it University of Padova, Dip. Ingegneria dell'Informazione	STASA	Professor	FIS/03
Andrea Valmorbida andrea.valmorbida@unipd.it University of Padova, Dip. Ingegneria Industriale	MMES	Researcher	ING-IND/12
Mirco Zaccariotto mirco.zaccariotto@unipd.it University of Padova, Dip. Ingegneria Industriale	MMES	Professor	ING-IND/04
Paola Zuppella zuppella@dei.unipd.it, Padova CNR-IFN	STASA	Expert	(FIS/03)

In addition, there are also annually elected doctoral student representatives. The number of doctoral student representatives is given by excess rounding the 15% of the total number of the Board components. Their participation is limited (by the Rules) to questions related to didactical and organization aspects.

6 Training Project

The standard duration of the PhD activity is three years. The PhD title is obtained having overall acquired 180 ECTS (European Credit Transfer and Accumulation System[1]) credits, and having conducted research activities with original contributions. In this document we adopt the equivalence of the Ministry of Education for International Doctorate which foresees 1 ECTS credit = 25 working hours (it is usually considered that there are 1,500 working hours in a year).
It is also assumed, in order to quantify the commitment to training the doctoral students, the equivalence between the ECTS credit and the university credit (CFU).
These credits are allocated according to the following scheme:
• 18 ECTS credits in three years for *educational activities*: this includes lectures, modules, seminars, participation to schools, courses.
• 12 ECTS credits in three years for *other activities*: this includes dissemination, assistant teaching and international research training.
• 150 ECTS credits for *research*, culminating in the PhD thesis.

6.1 Education

Training formation is divided into educational activities aiming to provide a common background to all doctoral students (interdisciplinary modules) and in educational activities more specifically dedicated to each Curriculum and specific thesis project. It should be noted that 18 ECTS in the three years are the minimum requirement, but 20-22 ECTS in educational activities are advised.

6.1.1 Interdisciplinary education

In the following there is the description of the foreseen interdisciplinary education activities, common to both STASA and MMES Curricula, as well the relative exam procedures.

6.1.1.1 Interdisciplinary modules

The Course is characterized by specific scientific topics, which are at the basis of the interdisciplinary education. To provide an adequate background on these topics to all doctoral students, the Course activates every year

- 20-hour courses (standard courses)
- 10-hour courses (short courses).

Such activities are interdisciplinary modules and are listed; each module is associated to a specific academic discipline.

- Aerospace propulsion (Prof. Pavarin) (ING-IND/07)
- Durability and Ageing of Organic Matrix Composites for Aircraft Applications (Prof. Gigliotti) (ING-IND/04);
- Electromagnetic radiation detectors and imaging systems (Prof. Naletto) (FIS/01)
- Exploring the solar system and its environment (Prof. Cremonese / Prof. Marzari) (FIS/05)
- Fundamental concepts of high energy astrophysics and cosmology (proff. M. Doro / R. Rando) (FIS/01).
- Introduction to Computational Fluid Dynamics (Prof. F. Picano/ Dr. Dalla Barba / Prof. A. Bottacin Busolin, ING-IND/06, 20-hour course)
- Measurement fundamentals and image analysis based techniques (Prof. Pertile / Prof. Rossi) (ING-IND/12)
- Mechanical and thermal properties of materials for aerospace applications (Prof. Galvanetto / Prof. Zaccariotto) (ING-IND/04)

[1] ECTS is based on the convention that 60 credits measure the workload of a full-time student during one academic year. The workload of a full-time study program in Europe amounts in most cases to 36/40 weeks per year and in those cases one credit stands for workload variation from 24 to 28 hours a week. The workload refers to the time in which it is believed that an average student can achieve the required learning outcomes.

- Planetary Optical Photogrammetry (Prof. C. Pernechele / prof. E. Simioni, 20-hour course) (FIS/01)
- Space optics (Prof. Pelizzo / Prof. A.J. Corso) (FIS/03)
- Space systems and their control (Prof. Francesconi / Prof. Valmorbida) (ING-IND/05).

The module syllabi are given in Appendix 8.1.

Students will achieve an interdisciplinary formation, that will be ascertained obtaining ECTS credits in all the academic disciplines specified above. This can be done attending and passing the exams of these interdisciplinary modules.
For these III level academic course 5 hours of lecture corresponds to 1 ECTS credit.
Attending a module without doing the exam allows the acquisition of a number of credits corresponding to 1 ECTS credit for 20 hours. Students must:

- choose the courses they intend to attend (at the beginning of the academic year) and the extended seminars they wish to take part in (after receiving the calendar, between December and January), filling the Excel file made available on the CISAS website[2];
- indicate in their personal training plan (see section 6.1.3) the attended modules and the exams done.

It is mandatory for STMS doctoral student to achieve at least 12 ECTS (60 hours) credits in interdisciplinary modules offered by the STMS PhD program before the end of the PhD. In case of special Training Plans and with the permission of the Course Coordinator an exception to this rule can be discussed.

6.1.1.2 Interdisciplinary module exams

The course lecturer informs the student on the way in which the exam will be done. The exam of each module should be done within one month after the end of module lectures; different timings can be agreed with the course lecturer.
After the exams, an evaluation of the student performance is provided: the possible scores are A (excellent), B (very good), C (good), D (acceptable), F (fail) and in between. In the latter case, the test has to be repeated. Each positively passed exam must be validated by the professor responsible of the module, filling in the "Passed exam" form (see Appendix 8.3); the filled form must be delivered by the student to the Course Secretary.
All the exams on the interdisciplinary modules must be completed within the second year of PhD: this is a necessary condition to be admitted to the third year. Derogations may be granted by the Course Coordinator in special cases such as prolonged staying abroad.

6.1.2 Curriculum oriented educational activities

In the following there is the description of the foreseen curriculum oriented educational activities, as well the relative exam procedures.

6.1.2.1 Curriculum oriented seminars

Short seminars
Each year the Course organizes a series of 1 hour held by professors of the course or external speakers. It is assumed that such seminars will be held twice a month.
For each of these seminars 0,2 ECTS is recognized. **The same rule can be applied for similar external seminars of the duration of 1-2 hours.**

[2] For reasons of good management of the educational activities, doctoral students must notify as soon as possible the Secretariat in case they change their intentions of attending 10, 20 and 30 hours courses and extended seminars; this is valid both for attending an educational activity that was not foreseen initially and for withdrawing the enrolment in an already chosen course/extended seminar.

Extended seminars

Each year, the Course organizes a series of 5-hours (2.5h+2.5) curriculum oriented seminars held by professors of the Course. The speakers will provide the most updated information about some of their research activities, or about a specific topic of potential interest for the PhD Course. Also speakers external to the Course can be invited.

These seminars should have the spirit of an exchange of ideas between the speaker and the audience, a sort of open discussion on the described arguments. On this respect, following the conclusion of the seminar, the doctoral students will prepare a short "summary" (either in the form of a written report, or as a short presentation) where they provide some comments on the discussed topics, needs of clarification, and proposals of in-deep discussion of some specific points. Within two weeks after the seminar, the speaker and the students meet again to discuss all together the points provided in the summaries. At the end of this second meeting, the students will acquire the credits relative to the seminar.

The calendar of the seminars is provided each year a few months after the official beginning of the PhD cycle. **For every exam-passed extended seminar 1 ECTS credit is assumed**. Doctoral students are invited to attend as many curriculum oriented seminars as possible, and to make the relative exams (i.e. participating to the final discussions).

It is required that a doctoral student have attended to at least 10 between short and extended seminars during the three years for being admitted to the thesis evaluation procedure.

6.1.2.2 Other University courses

For his/her specific training, a doctoral student can also choose other PhD courses and/or post-lauream courses in case they are expected to be useful for the training. For these courses the correspondence between CFU and ECTS credits is assumed.

The PhD Educational Week, activated yearly by the University of Padova (to be confirmed) and focusing on transversal skills dedicated to doctoral students. Attendance at this activity is useful in terms of credits to be considered in the student credit account.

University courses (Master Degree-II level) can be also attended, however no ECTS credits can be achieved. All these courses must be approved by the Course Coordinator.

6.1.3 Personal training plan

Twice per year doctoral students must provide a "personal training plan" with the indication of which modules activated by the Course they have only attended and of the exams they have passed. They must also include any other educational activity they have done, with an indication about the type of activity, the period in which this activity has been carried out and how many ECTS credits have been acquired. The template for the personal training plan can be found in Appendix 8.5.

The personal training plan should be submitted for the first time six months after the beginning of the PhD and then twice a year (end of March and end of August), with the indication of the progress in achievement of ECTS credits in educational activities.

The training plan may be amended, upon approval of the Course Coordinator, until the end of the second year. Any changes to the training plan have to be highlighted in the personal training plan updates, and must be approved by the Course Coordinator.

The recommended distribution of credits achieved for the various educational activities is 60%, 30%, 10% ECTS credits in the first, second and third year respectively. However, **the following minimum number of credits have to be obtained: at least 8 and at least 14 ECTS credits must be achieved at the end of the last month of first and second year, respectively**. **A smaller number may lead to the not-admission to the following year**. Six months before the conclusion of the third year (end of March), all the foreseen ECTS

credits for educational activities/training must have been obtained; exceptions can be granted only in case of prolonged suspension justified by the Course, or extended staying abroad.

6.2 Other activities for Research Training

Doctoral students should dedicate every year some time on different other activities finalized to the research training. The activities are quantified using equivalent ECTS and 12 ECTS should be acquired before the admission to the final exam. To be admitted to the third year 6 ECTS should be acquired, exceptions can be granted in case of documented justifications or extended staying abroad, approved by the PhD course Coordinator. Among these activities, participation to ESA student project or similar (e.g. Rexus/Bexus), Conferences/Workshop, Support Teaching/Tutoring, research period abroad academic or non, dissemination activities (e.g. 3-minutes thesis competition, Science4 all, ...) and similar activities are considered. Note that for these activities the doctoral students need to ask the permission to the Course Board (or Coordinator).

- Participating to **International Conferences and Workshops** both as speaker and/or attendant will provide credits. Simple attendant: 1ECTS per event, Speaker 2ECTS.
- **Prolonged research visits in foreign** (academic or not-) institutions will provide credits: 1ECTS for 15days (max 6ECTS).
- **Prolonged research visits in national** (academic or not-) institutions will provide credits: 0.5ECTS for 15days (max 3ECTS).
- Doctoral students can attend to **Advanced/Summer/Winter/Training Schools** in order to improve their background in specific areas related to their PhD thesis project. Every participation will grant 0.5ECTS per day with more than 4 hours of activities (max 2ECTS per event).
- Doctoral students can dedicate every year some time **on tutoring or on teaching support** (in Italian, “didattica integrativa”) activities (NB: the latter is presently limited to maximum 40 hours/year). 1 ECTS will be obtained every 10 hours, (max 4ECTS per year). These activities must be approved by Course Board, following the directions of the Academic Bodies. In Appendix 8.4 there is a template for the request to the Board.
- Participation to **public engagement** activities and events, e.g. Sciences for all. Depending on the effort spent, but in average 0.5ECTS per day will be achieved with more than 4 hours (max 2ECTS per event).
- **Participation to the 3-Minutes-Thesis-Competition** will provide research training credits: 1ECTS for participation to the PhD course internal selection, 1ECTS for the University selection, 2ECTS for the international final.
- Doctoral students may participate, after having informed the Course Board, to the **Academy programs (REXUS/BEXUS, Fly Your Satellite!, …) or other similar students' University projects or competitions (ERC - European Rover Challenge, EuRoC – European Rocket Challenge, …)**. As these activities are extremely educational**,** doctoral students may acquire up to 3 ECTS credits depending on the dedicated time.
- The student can propose to give an **academic lecture** (around 45 minutes) in the topic of one interdisciplinary module. The lecture has to be structured to be addressed to a potential audience of students. The lecture has to be described in an analytical and sequential way, properly detailing several aspects to improve the understanding of the subject, or of any complex logical steps. If both doctoral student and professor agree, there is the possibility to have this exam as a real lecture, actually teaching to the first year doctoral students during one of the foreseen modules, under the supervision of the Professor. Once the lecture has been performed 1ECTS is assigned. Invited seminars in higher education or research centers can be considered equivalent to an academic lecture.
- During **STMS PhD meetings**, Doctoral Students present their research advancements which will be also considered for their admission to PhD course, second/third year and final exam. These meetings are very important since it is possible to exchange ideas among PhD students and

professors. The attendance is always mandatory and will provide 0.5 ECTS research credits per attendance.

- **Important personal fellowship and grants** for research visits/travels abroad (e.g. Fulbright, Zegna, ESA,…) max 1ECTS.

Among these activities it is required to participate to all the STMS PhD student meeting, one international conference as speaker, while it is strongly advised a research exchange visiting period in an abroad institution of at least 3 months. Derogations may be granted by the Course Coordinator in special cases such as prolonged staying abroad.

6.3 Other commitments

Further commitments (reports, obligations and so forth) may be required by PhD grants upon European or national funding. We suggest consulting the relevant documentation bound to the call or to the grant, where available.

6.4 Research

Research is the primary instrument of the doctoral training project, to which the student devotes more than 80% of the total workload in the three years of the Course. The research product should be innovative and classified in at least one of the following categories: new tools/equipment, new know-how, new processes, new methods, publications, spin-off. In carrying out his/her research, under the tutoring of a supervisor and of a co-supervisor assigned by the PhD Course Board, the doctoral student shall contribute original contents. From 38th cycle for each doctoral student is ordinarily foreseen a period of research and training abroad, as per new PhD regulation. To this end the University has a specific allocated budget to increase the basic PhD grant for periods abroad longer than 15 days. Periods longer than six months (even not consecutive) have to be approved by the PhD Course Board. The template for the request to the Board can be found in Appendix 8.6. An invitation (letter or e-mail) by the hosting institution must be attached to the request.

6.5 PhD Thesis

The research realized by the doctoral student is documented by the doctoral thesis. The thesis must describe in an analytical way the research activity, highlighting the original contributions given by the doctoral student. The supervisor verifies that the thesis is conformal to the foreseen activity program.
Upon request, it is possible to write the PhD thesis in the optional type "paper collection". For any information, please see the guidelines published on the CISAS website at the web page: https://cisas.unipd.it/phd-course-dottorato/final-exam-and-phd-thesis-submission.
As concerning the final discussion (thesis defense), according to the regulations, specific instructions for the language are foreseen only in case of co-tutele. Out of this case, it is possible to choose between Italian and English; English is strongly recommended, since the official language of the STMS PhD Course is English.

6.5.1 Thesis title and research objectives

The research subject of the doctoral thesis is identified since first year, giving it a title and defining its objectives and the international context. Under motivated circumstances, the proposed research may be changed during the first year, even substantially: this has to be agreed with the supervisor and must be approved by the Course Board. In the years following the first, the doctoral thesis can be adjusted with only minor changes, unless exceptional causes arise in which case it must be approved by the Course Board. The final title of the thesis must be determined at the end of the second year; later significant changes to the title must be approved by the Course Board.

6.5.2 Foreign language thesis

The thesis can be written in Italian, in English or other foreign language agreed with the PhD Course Board. Since the topics covered in this Doctoral Course are often devoted to international scientific research that uses almost exclusively the English language, it is strongly suggested to write the thesis in English. Please note that, as required by University regulations, to write the thesis in a language different from English or Italian it necessary to ask the permission of the PhD Course Board: this request must be made at the end of the first year of the PhD, when presenting the documentation for admission to the second year.
The thesis, regardless of the language in which it is written, must however contain a section summarizing the work done in English. Special rules may be foreseen in case of co-tutele.

6.5.3 Summary of the doctoral student work

In order to facilitate the evaluation of the thesis, the doctoral student must include in the introductory part of the thesis a less than 3-page summary in English, also in bullet form, indicating what are the actual contributions made by the student in the totality of the described work. This has to be done with references to the relevant sections, highlighting the original/innovative contributions.
For doctoral students in co-tutele special rules may be established with reference to the language of the abstract (not only for thesis, but also for the oral presentation for the day of the defense).

6.5.4 Thesis development

The development of the doctoral thesis must start from the first year of PhD, on the basis of the program of the expected research activities.
For admission to the second year, the doctoral student must submit to the PhD Course Board:
- a complete index (content) of the thesis.

For admission to the third year, the student must submit to the PhD Course Board:
- a script of the thesis: the latter consists of a structured index, corresponding to the state of the work and to the prediction of future activities, and, for each section of the index, either a preliminary description of what the student will write in, or a draft of the final document[3].

For the admission to the thesis evaluation procedure, the student must submit to the PhD Course Board:
- a draft of the thesis: this corresponds to about 50% of the final report, and must include both the summary in the foreseen second language and the summary of the doctoral student work.

In all cases, the supervisor checks that the work adheres to the foreseen program of activities of the student, and ensures that the quality and quantity of the text are appropriate for the current state of research.

6.5.5 Other suggestions for the thesis editing

In the dissertation should be highlighted, wherever applicable, the topics covered in the interdisciplinary and curriculum dedicated courses, highlighting the connections between what has been learnt in these courses and the possible applications to the thesis topics.
In case dedicated software has been developed, it is desirable to adhere to European standards for appropriate documentation and usability, as already mentioned.

Note that the writing of the thesis typically requires about 10% of the total commitment for research (i.e. more than 3 months): it is required that the doctoral student provides adequate time for its preparation.

In order to avoid large differences in the layout of the thesis, it is recommended to follow the following standards:
- Font: Times New Roman 11/12 pt (or similar)
- Line spacing: 1 - 1.2 lines
- Margins (A4): 2.5 cm top, 2 cm bottom, 2 cm external, 2/2.5 cm internal.

[3] It should be noted that the script of the thesis is not just the complete index presented for the second year admission.

Further information about the thesis format is available at the web page of the final exam, section named "Regole editoriali" (including the official template for the front page of the thesis): https://www.unipd.it/dottorato/esame-finale-consegna-tesi-dottorati

Finally, for additional information, Art.s 31-34 of the University Rules on Doctoral Thesis are here reported (in Italian) at Appendix 8.7.

7 STMS PhD Course Management

7.1 Doctoral student activity program

The activities of each doctoral student are documented by the "Analytical report of the doctoral activities". This report, which includes the personal training plan, shall be submitted to the PhD Course Board: at first shortly after admission to the Course for the approval of the proposed research, and then at the end of the academic year for the admission to following years and to the thesis evaluation procedure. The template of the analytical report is given in Appendix 8.8.
To be admitted to the second and the third year as well as to the thesis evaluation procedure, the doctoral student must also describe the ECTS credits acquired in educational activities in the personal training plan (end of March and end of August) and the thesis status. In addition, among the criteria to be considered for admission to the next year, also the update by the student of the personal Cineca web site (for creating and accessing it go to https://loginmiur.cineca.it/front.php/login.html) will be considered.
For the admission to the thesis evaluation procedure of a doctoral student, the supervisor has to prepare an evaluation form to be approved by the PhD Course Board. The evaluation form template can be found in Appendix 8.9.

7.1.1 Research program guidelines

For better planning of activities, and to form a nowadays necessary managerial way of thinking, it is suggested to adhere to the following planning for the thesis development.

- To formulate a research program indicating both the scientific and technical content, and the foreseen amount of commitment in the form of Work Breakdown Structure (WBS); the WBS has to be developed at least to the first/second level for first year doctoral students, and at least to second/third level for admission to the second year.
- To illustrate the temporal evolution of the program through a Gantt Bar Chart, in agreement with the WBS. In the first year, it is convenient to expand the chart to have visibility on a quarterly basis for the first year, and at least on a six-month basis for the other two years. From the second year, all the chart has to be expanded with at least 3 months of temporal resolution.

In the following there are examples of WBS and Gantt Chart (the templates used in these examples are available in excel format on the PhD Course web page).

WORK BREAKDOWN STRUCTURE

PHD STUDENT		DATE	
PHD THESIS		ADMISSION TO	

WBS NUMBER	TASK TITLE	START DATE	DUE DATE	DURATION (WEEKS)	WP TECHNICAL DESCRIPTION
1	First level: activity 1				
1.1	Second level: activity 1.1	01/10/20XX	31/03/20XY	XX	
1.1.1	Third level: activity 1.1.1	01/11/20XX	31/05/20XY	YY	
1.1.2	Third level: activity 1.1.2	01/12/20XX	31/07/20XY	ZZ	
1.2	Second level: activity 1.2	…	…	…	
1.2.1	Third level: activity 1.2.1	…	…	…	
…	…	…	…	…	
…	…	…	…	…	
2	First level: activity 2				
2.1	…				
…	…				
…	…				
…	…				
3	First level: activity 3				
…	…				
…	…				
…	…				
…	…				
4	First level: activity 4				
…	…				
…	…				
…	…				
…	…				

***Notes*: Students beginning the first year should show an analysis at least to level 1; for admission to second year, an analysis to at least level 3 is requested. For each level 1 WP, describe its characteristic technical content, to justify the sublevels indicated in the WBS.**

GANTT CHART

PHD STUDENT		DATE	
PHD THESIS		ADMISSION TO	

WBS NUMBER	TASK TITLE	% OF TASK COMPLETE	FIRST YEAR												SECOND YEAR												THIRD YEAR											
			T1			T2			T3			T4			T1			T2			T3			T4			T1			T2			T3			T4		
			O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
1	First level: activity 1																																					
1.1	Second level: activity 1.1	100%																																				
1.1.1	Third level: activity 1.1.1	100%																																				
1.1.2	Third level: activity 1.1.2	100%																																				
1.2	Second level: activity 1.2	40%																																				
1.2.1	Third level: activity 1.2.1	70%																																				
...	...	60%																																				
...	...	50%																																				
2	First level: activity 2																																					
2.1	...	5%																																				
...	...	30%																																				
...	...	0%																																				
...	...	0%																																				
3	First level: activity 3																																					
...	...	0%																																				
...	...	0%																																				
...	...	0%																																				
...	...	0%																																				
4	First level: activity 4																																					
...	...	0%																																				
...	...	0%																																				
...	...	0%																																				
...	...	0%																																				

***Note*: Students entering the first year should present a Gantt chart at least to level 1/2 of the WBS; for admission to second year, a chart at level 2/3 is requested.**

7.2 PhD Course program management

The program of the PhD Course is organized in a series of events which involve both doctoral students and professors. The following table provides the calendar (Nov-Oct) of the major events[4].

Event	Period	Presence of doctoral students	Presence of Professors
Meeting with first year doctoral students*	Nov	First year	Coordinator
Doctoral student representative election	Within 2 months from the beginning of the academic year	All the students regularly enrolled in the PhD Course, including the ones who are recovering suspension	Coordinator
Presentation of first year research programs and Course admission*	Nov/Dec	All	Course Board and Supervisors
Course Board meeting	Nov/Dec	Representatives	Course Board and Supervisors
Thesis evaluation*	Oct-Dec	Third year students admitted to the thesis evaluation procedure	Coordinator and Supervisors
Course Board meeting	Nov/Dec (TBC)	Representatives	Course Board and Supervisors

[4] Some of the deadlines (indicated with *) may vary in case a doctoral student starts his/her PhD later because of suspension or if he/she is admitted to the PhD upon a specific call, different from the general PhD call: in these cases, some of the deadlines may vary accordingly. For the admissions of these doctoral students, specific meetings will be fixed; the date will be communicated well in advance.

Event	Period	Presence of doctoral students	Presence of Professors
Meeting with first year doctoral students*	Nov	First year	Coordinator
Doctoral student representative election	Within 2 months from the beginning of the academic year	All the students regularly enrolled in the PhD Course, including the ones who are recovering suspension	Coordinator
Final exam*	Jan-Mar	Third year students admitted to the final exam	Coordinator
Lectures	Jan-Jun	Involved students	Involved lecturers
Training program / Credits update*	Mar/Apr	All	Coordinator
Course Board meeting	Mar	Representatives	Course Board and Supervisors
PhD Course admission exam*	May/June		Admission committee
Training program / Credits update*	Sept/Oct	All	Coordinator
Admissions to 2nd, 3rd year and thesis evaluation*	Sept/Oct	All	Course Board and Supervisors
Final exam admission*	Sept	Third year students	Course Board and Supervisors
Course Board meeting	Sept/Oct	Representatives	Course Board and Supervisors

7.2.1 Three-years calendar of the doctoral student major events

Event	Period	Description and comments
Introductory meeting*	Nov I	Presentation of the STMS PhD Course by the Coordinator
Risk assessment form*	Nov/Dec I	Submission of the risk assessment form
Approval of research proposal*	Nov/Dec I	Documents required for the approval of the proposed research have to be provided at least one week before the meeting of the Course Board Presentation of the proposed research program (In case) Request of work offsite and request of affiliations
PhD student representative elections	Within 2 months from the beginning of the academic year - I	
Safety course*	Jan I	Demonstration of having passed the on-line safety course
Lectures	Jan-Jun I	
Admission to second year*	Oct I	Documents required for the admission to the second year have to be provided at least one week before the Course Board meeting Presentation of the research activity done during the first year

Event	Period	Description and comments
Doctoral student representative election	Within 2 months from the beginning of the academic year - II	
First year student presentation*	Nov II	Participation is mandatory
Lectures	Jan-Jun II	Modules not attended during first year
Update of personal training plan*	Apr II	
Admission to third year*	Oct II	Documents required for the admission to the third year have to be provided at least one week before the Course Board meeting Presentation (in English) of the research activity done during the second year
Doctoral student representative election	Within 2 months from the beginning of the academic year - III	
First year student presentation*	Nov/Dec III	Participation is mandatory
Update of personal training plan*	Apr III	The minimum number of ECTS credits in educational activities
Admission to thesis evaluation procedure*	Oct III	Documents required for the admission to the thesis evaluation procedure have to be delivered at least one week before the Course Board meeting Presentation (in English or other agreed foreign language) of the research activity done during the whole PhD period
Delivery of the thesis to the evaluators*	Nov IV	
Delivery of Course evaluation form*	Nov IV	
Final exam*	Feb-Apr IV	Thesis defense with an external Board

If a doctoral student cannot attend an official event, he/she has to send in advance a justification to the Secretary and the Coordinator for approval. In case of absence due to force majeure, the student is required to notify the Coordinator as soon as possible. In particular, an absence to the event where the presentation for admission to the following year of the doctorate has to be held can be justified only in case of illness or prolonged stay abroad. In these cases, when possible, the presentation can be done remotely by suitable telecom systems. Otherwise, the student supervisor must make a presentation of the activities on behalf of the student. The absence to the event where the presentation for admission to the thesis evaluation procedure has to be held will be considered case by case. The meetings could be held in presence or remotely by suitable telecom systems.

7.2.2 Documentation needed for formal approvals

Doctoral students have to provide the following documentation in electronic format (if not differently stated) to the Course Secretary.

Approval	Required Documentation
Admission	- Declaration of having an ORCID (mandatory) - Risk assessment form (original) - Analytical report + WBS + GANNT - Presentation of the proposed research program - (In case) Request to work offsite and request of affiliation
Admission to second year	- Updating of the analytical report, approved by the supervisor; it has to include the personal training plan demonstrating the achievement of at least 8 ECTS credits + WBS + GANNT - Complete index of the thesis - declaration of updating the Cineca personal site - in case, request to write the thesis in a language different from Italian or English - Presentation of the work done in the first year
Admission to third year	- Updating of the analytical report, approved by the supervisor; it has to include the personal training plan demonstrating the achievement of at least **14 ECTS credits** and of passing all interdisciplinary course exams; **6 ECTS credits in other training activities;** last term for modifications to be approved by the Curriculum Board + WBS + GANNT - Description of thesis structure - Declaration of updating the Cineca personal site - Presentation in English of the work done in the second year
Admission to thesis evaluation procedure	- Updating of the analytical report, approved by the supervisor; it has to include the personal training plan demonstrating the achievement of at least 18 ECTS credits and of passing all foreseen exams+ 12 ECTS credits in other training activities + WBS + GANNT - Draft of the thesis - Declaration of updating the Cineca personal site - Presentation in English of the work done during the PhD

Lack of the required documentation might entail not admission to the thesis evaluation procedure and even expulsion/forfeiture from the Doctoral Course.

7.2.3 Supervisor schedule and list of the documentation

Supervisors also are involved in the Course activities: their tasks follow the doctoral student activities and the main events are summarized in the following table.

Activities	Period	Required documentation
Approval of the research programs proposed by first year doctoral student*	Nov/Dec I	Approval of analytical report
Admission of doctoral student to second year*	Oct I	Approval of analytical report and of thesis index. Short doctoral student evaluation (max 10 lines by e-mail)
Admission of doctoral student to third year*	Oct II	Approval of analytical report and of thesis structure description. Short doctoral student evaluation (max 10 lines by e-mail)

Activities	Period	Required documentation
Indication of 2+1 thesis evaluators	Jun III	
Admission of doctoral student to thesis evaluation*	Oct III	Approval of analytical report and of thesis draft. Final doctoral student evaluation
Uploaded thesis validation*	Jan IV	

7.2.4 Coordinator schedule

The Course management foresees periodic activities, listed in the following table.

Event	Period	Activity
Meeting with first year doctoral students*	Nov	
Election of doctoral students representatives	Within 2 months from the beginning of the academic year	
Annual PhD Report	Nov	
Foreign candidates evaluation committee definition	Oct	
Course Board meeting*	Nov/Dec	Admission to first year, authorizations to work offsite
Final exam Committee Proposal*	Nov	Cineca form to fill
Evaluation thesis procedure*	Dec-Jan	
Course Board meeting	Feb/Mar	Fund assignment to PhD students
Final exam*	Jan-Mar	
Pre-activation PhD cycle (“Accreditamento”)	Feb	Cineca form to fill
Activation of new PhD cycle (“Anagrafe”)	Mar	Cineca form to fill
Proposal of members for next admission exam Committee	Mar	
Course Board meeting	Mar	Admission exam committee
New PhD cycle Call	Apr	Cineca form to fill
Thesis evaluators preliminary definition	Jun	
Admission exams	May/Jun	
Proposal of evaluators	Jul	
Courses calendar definition	Sep-Nov	
Course Board meeting	Sep/Oct	Admission to II, III year, thesis evaluation
Thesis evaluators definition*	Sep	Cineca form to fill

7.3 Management of financial resources

All PhD funds are managed by the Coordinator and the Course Board, in accordance with the procedures established by the University: they are mainly dedicated to cover the mobility of doctoral students, of the Coordinator and other educational activities activated by the Course.

In addition to these funds, each doctoral student has available for his/her research a personal fund corresponding to 10% of this annual grant. Following the University Rules, allowed expenses that can be covered with these personal funds are:

- Travel;
- Conference/seminar fees;
- Consumables for research activities (i.e. where it not possible to put the inventory label);
- Publication expenses;
- Specific educational expenses finalized to research (for example, language courses);
- Books and articles in paper and/or electronic format;
- IT supports for research activities (e.g. software licences, …);
- IT devices for research activities (personal computer, tablet).

All the expenses have to be authorized by the Coordinator. For all administrative questions and for requesting mission authorization it is requested to contact in advance the CISAS administration.
Considering that there are some limitations, for the expenses related to missions or purchasing, it is necessary to contact in advance Ms. Valentina Ciprian in order to know the availability of funds.

7.4 Miscellanea

7.4.1 Safety

All doctoral students are considered as University employees for what concerns their safety at work. As such, they all have to attend the on-line safety course, and to pass the exam. For all information, please look at the https://www.unipd.it/corsi-formazione-sicurezza
The training to be carried out consists of:
- General training course
and, in combination,
- Specific training course
    * low risk, if you only carry out office activities or in exclusively IT laboratories
or
    * high risk if you carry out activities in any other type of laboratory.

Also the attendance of the Covid safety Course is required.
All doctoral students who have access to any laboratory have to be properly instructed by the safety lab appointed (in Italian, “preposto”) with dedicated safety courses.
In case the initially foreseen activities change (for example, attendance of new laboratories), it may be necessary to attend new specific safety courses, to be defined by the safety lab appointed ("preposto"); once passed the course, it is necessary to send by email a self-declaration of having passed the new safety course/s to the PhD Secretary**.**
On the e-Learning platform is available, from November 2021, a new specific course for people who attend educational and research laboratories, named “Formazione specifica in materia di tutela della salute e della sicurezza dei lavoratori impiegati nelle attività di laboratorio - Classe di rischio alto”. This course lasts 12 hours and must be done after having attended and pass the general course. It is available at the link https://elearning.unipd.it/formazione, clicking on “Area sicurezza” and then on "Formazione specifica – attività a rischio alto". The course replaces the previous “Corso Frequentatori (dei laboratori di ricerca)”, that is not available anymore. UniPd workers and students who attended the latter course must attend the new course, quoted above.

7.4.2 Risk assessment

All doctoral students have to fill at the beginning of their PhD activities a risk assessment form. This form can be found in Appendix 8.11. The form has to be filled in together with the supervisor and delivered/sent to the Course Secretary as soon as the PhD activities start.

In case the initially foreseen activities change (for example, attendance of new laboratories), the risk assessment form has to be updated and delivered/sent to the PhD Secretary.

7.4.3 Publications

When included in a publication author list, a doctoral student must indicate CISAS (Centro di Ateneo di Studi e Attività Spaziali "Giuseppe Colombo", Via Venezia 15, I-35131 Padova - Italy) as primary affiliation. Other affiliations, for example a hosting department, can then be added. In the case of publications realized after the completion of the PhD period, in case they are relative to an activity performed during the PhD period, CISAS should be considered as a secondary affiliation.
All doctoral students have to get an ORCID (Open Research and Contributor ID), a code that uniquely identifies scientific and other academic authors and contributors. This will be needed to fill in the requested information in the Cineca web page, is a code now requested by many journals for publishing and is mandatory according to the recent AVA3 guidelines.

7.4.4 Off-site PhD activity

Doctoral students may have the need to mainly realize their PhD activities out from Padova, for example because that is the place in which they can use the facilities needed for the best development of their research. In all these cases, the PhD Board has to approve the off-site PhD research activity. If approved, the doctoral student cannot ask mission reimbursement for travels to/from Padova and the research activity location. In Appendix 8.12 the template for asking this permission to the Course Board can be found.

7.4.5 External working activities

Doctoral students can make temporary external work activities if they are compatible with the foreseen full time PhD study and research commitments; according to the new PhD regulation, the working activities must allow the doctoral students to get knowledge related to the topics of the PhD Course. These activities have to be approved by the Course Board. In Appendix 8.13 the template for asking this permission to the Course Board can be found. Some limitations may be possible for the holders of some kinds of PhD grants; sometimes it may be necessary to verify with the Ufficio Dottorato di Ricerca of Padova University.

7.4.6 Affiliations

In case a doctoral student is interested in affiliate to a national research institute (i.e. CNR, INFN, INAF, …) for collaborating to scientific researches of interest for his/her PhD activities, a request has to be sent to the Course Board which has to provide a "nulla osta" statement. In Appendix 8.14 the template for asking this permission to the Course Board can be found.

7.4.7 Evaluation of the Course

At the end of the third year, students fill in the anonymous questionnaire shown in Appendix 8.15, which is made known to the Course Board. This questionnaire is just for internal use of the Course; another official questionnaire will be requested to fill in by the PhD Office of Padova University at the end of the PhD period. A support of the doctoral students' representatives may be required in collecting the questionnaires**.**

7.4.8 Language support

Doctoral students, if willing, can attend the English Language courses activated by the University Language Centre (http://cla.unipd.it/claplus/general-english-claplus/), since it is considered fundamental for a student of this Course an excellent knowledge the English language.
Foreign students can attend the "Italian for foreigners" courses activated by the University Language Centre (http://cla.unipd.it/en/communicative-italian-courses/).
In our PhD course it is assumed that doctoral students have already a good knowledge of English language. We suggest, to those interested, to attend language courses, but **this cannot be part of the Training Plan of the PhD Course so no ECTS for language courses will be recognized**.

7.4.9 Additional information

Students are invited to consult the website of the university (https://www.unipd.it/en/teaching-and-research/doctoral-degrees-phd-programmes) for information regarding:

- PhD Courses and doctoral courses active
- Thesis
- Forms
- Taxes
- Economic benefits
- Accidents at work and occupational diseases (INAIL)
- Living abroad (authorization and increase the scholarship)
- Scholarship (mode of delivery and social security deductions INPS information)
- Ranking regional grants
- E-mail (any doctoral student will be assigned an e-mail address).

Foreign students are also invited to contact the SAOS university office (https://www.unipd.it/en/saos-desk) for all issues relative to their legal stay in Italy.
The main PhD office of Padova University (Ufficio Dottorato di ricerca) prepared a PhD guide, that may be useful for all the doctoral students. It is available in many languages (not only Italian, but also Chinese and English) at the link https://www.unipd.it/dottorato/phd-guide

8 Appendixes

Many of the forms listed in the following are available for download on the Course web site (http://cisas.unipd.it/phd-course-dottorato/forms). All the official requests to the Course Board or to the Course Coordinator, must be sent by email to the Secretary, **in cc the Coordinator and the Supervisor**.

8.1 Syllabi of the courses activated by the STMS PhD Course

8.2 Attendance declaration

8.3 Passed exam form

8.4 Request of authorization for making educational support activity

8.5 Personal training plan

8.6 Request of authorization for spending periods outside Padova University

8.7 Extract from the University Regulations on Doctoral Thesis

8.8 Analytical report of the doctoral activities

8.9 Evaluation form for the admission to the final exam

8.10 Risk Assessment form

8.11 Request of authorization for carrying out off-site the PhD research activity

8.12 Request of authorization for making paid activity (didattica integrativa, tutoring, external job)

8.13 Request of authorization for association

8.14 STMS PhD Course evaluation form

8.15 STMS courses evaluation form

Syllabi of the courses activated by the STMS PhD Course

Aerospace propulsion (Prof. D. Pavarin, 20-hour course)
Description at sub-system level of Chemical propulsion system, Tsiolkovsky equation. Performance parameters, specific impulse, system specific impulse. Characteristic velocity. Nozzle simplified equations, converging diverging nozzles, pressure profile within the nozzle, nozzle performances at different altitude. Solid rocket motors, general description, main components, equilibrium pressure, main operative parameters, erosive combustion. Liquid Rocket Motors, main components, pressurization systems. Electric propulsion, plasma propulsion, low thrust conditions, Tsiolkovsky equations in case of low thrust conditions, electro-thermal, electrostatic and electromagnetic propulsion systems.

Durability and Ageing of Organic Matrix Composites for Aircraft Applications (Prof. M. Gigliotti, 10-hour course)
The Course focuses on durability and ageing of organic matrix composites for aircraft applications, encompassing both experimental and modelling aspects, both at the research and at the industrial level. The course focuses on:

- Phenomenology and experimental assessment of ageing and durability phenomena in OMC
- Modelling of ageing and durability phenomena in OMC
- Characterization, identification and simulation of ageing and durability phenomena in OMC.

Electromagnetic radiation detectors and imaging systems (prof. G. Naletto, 10-hour course)
Photoemission detectors: Photoelectric effect; Quantum efficiency; Photocathode, photomultiplier, channeltron, microchannel plates (MCP); MCP detectors, image intensifiers; single anode and multi-anode readout. Semiconductor detectors: Atomic theory, Semiconductors; pn junction; Photodiodes; SPAD and SiPM; semiconductor detector spectral sensitivity. CCD operation and configurations; spectral response; Correlated Double Sampling. Passive and active CMOS (APS); Fill factor; Shutter mode; Hybrid detectors; Sensor-on-chip. Detector Noise Sources; Camera resolution, Modulation Transfer Function; Aliasing.

Exploring the solar system and its environment (Prof. G. Cremonese / Prof. F. Marzari, 20-hour course)
The course is divided in two sections, in the first one there will be a technical-scientific description of the space missions and instruments, while the second one a theoretical description of the physical characteristics of the Solar System. Introduction to the main physical characteristics of the Solar System planets. Introduction and description of the main space missions that explored or will explore the Solar System, from the scientific objectives to the instruments on board. We will discuss some details of some instruments where Padova is strongly involved, as BepiColombo and Exomars. Description and discussion of the model for the formation of planets and its application to the Solar System and the known exoplanetary systems. Overview of the main physical properties of the planets with focus on their magnetic fields and their interaction with the solar wind, formation of the magnetospheres. Brief summary of the non-gravitational forces acting on the minor bodies populating many known planetary systems and related to the absorption and scattering of the solar radiation.

Fundamental concepts of high energy astrophysics and cosmology (prof. M. Doro, prof. R. Rando, 20-hour course)
1/ Cosmic Ray Physics The Cosmic Ray (CR) Spectrum at Earth. Brief review of the standard model of elementary particles and interactions. Composition and abundance of CRs. Primary and secondary CRs. Experimental detection of CRs and some history. CR propagation and trapping in Earth magnetic field. Acceleration of CRs. Source of CRs. Multimessenger astrophysics.
2/ Fundamental Concepts of Cosmology of the Early Universe: Thermal history of the Universe: Inflation in the primordial universe, Baryogenesis. Primordial nucleosynthesis of light elements. Hydrogen recombination: Radiation decoupling. Cosmic Microwave Background. Expansion of the Universe and its

relation to the energy density of fields, Cosmological Principle. Geometric properties. Hubble constant and deceleration parameter. Definitions of distance in Cosmology; redshift and Hubble's law (approximate treatment at low redshift). Dark Matter evidence, structure formation.

Introduction to Computational Fluid Dynamics (Prof. F. Picano, Dr. F. Dalla Barba, prof. A. Bottacin Busolin, 20-hour course)
The course will introduce to the computational description of fluid flows for engineering and aerospace applications. The lectures will review the laws governing fluid dynamics, the main aspects of turbulent flows with related modeling approaches and the fundamental aspects of computational fluid dynamics. Moreover, the last part of the course will be devoted to practice with a commercial solver in order to set-up and run CFD simulations of aerodynamic problems with different meshing techniques and physics models.

Measurement fundamentals and image analysis based techniques (Prof. M. Pertile / Prof. G. Rossi, 20-hour course)
Elements of statistics and inference; uncertainty analysis and propagation methods. Analog-to-digital conversion of time-varying signals and related problems. Programming fundamentals of PC-based acquisition systems. Measurement techniques based on visible and infrared imaging systems. Contactless shape, stress and strain measurements.

Mechanical and thermal properties of materials for aerospace applications (Prof. U. Galvanetto / Prof. M. Zaccariotto, 20-hour course)
Composite materials are finding an increasing use in the engineering fields where high specific properties (strength/density, stiffness/density) are required. Airplanes and spacecraft are typical structures in which the need of mass reduction makes composite materials very convenient. The lecture course is more concerned with the structural aspects of the use of composites and therefore it provides the preliminary elements for the structural design of structures made with heterogeneous materials and for the evaluation of their strength and stiffness. The second part of the lectures covers the structural design of instruments for space applications, definition and identification of main external /internal loads, resistance criteria for metallic materials and optical glasses; study of the expected thermal and mechanical disturbances during a space mission, methods of thermo-mechanical optimization for the reduction of disturbance effects.

Planetary Optical Photogrammetry (Prof. C. Pernechele / prof. E. Simioni, 20-hour course)
The course aims to describe the optimized optical systems for the acquisition of images for photogrammetric use and to teach the extraction processes of topographic information from satellite images of planetary surfaces. Participants will receive an introduction of the fundamentals of optics and digital photogrammetry oriented to the acquisition systems for the extraction of Digital Elevation Models and orthophotos. The course will offer a complete overview of the three-dimensional reconstruction process starting from the design of an optical payload (current such as CaSSIS for ExoMars2016 and STC / SYMBIO-SYS for the BepiColombo mission or future such as PANCAM for the Daedalus mission), to the use of Spice Kernels and the photogrammetric current algorithmic basis.

Space Optics (Prof. Prof. M.-G. Pelizzo/ Prof. A. J. Corso, 20-hour course)
Propagation models of light. Realization of an optical system: design, opto-mechanics, alignment and integration, calibration. Geometrical optics and wave optics. Reflection and refraction laws. Image formation. Diffraction limited system and Airy Disk. Paraxial optics. Lens and mirrors components in paraxial optics. Apertures and diaphragms, field of view and f-number. Optical path, chromatic aberration and first order aberrations. Wavefront aberrations. Point Spread Function. Resolution of an imaging system. Telescopes: Gregorian, Galileian, Cassegrain, Schmidt Camera with examples. Introduction to spectroscopic systems. Grating theory. Fundamental configurations with examples. Multispectral and Hyperspectral imaging. Ray-tracing with professional software. Design, analysis and optimization of a single lens and an achromatic doublet. Performances of optics system by merit figures. Design and optimization of a Schmidt camera and

of a Cassegrain telescope. Even-polynomial plate and Maksutov meniscus for spherical aberration correction. Field flattener.

Space systems and their control (Prof. A. Francesconi / Prof. A. Valmorbida, 20-hour course)
In orbit relative motion during proximity maneuvers. Various two-satellite in-orbit rendezvous strategies. Examples of rendezvous between the International Space Station and approaching vehicles. Common sensors for attitude measurement which make use of external targets. Satellite attitude determination techniques. In-orbit satellite attitude motion and main control techniques: gravitational gradient, gyroscopic rigidity, and "null momentum" systems. Examples of relative attitude control with small satellites, finalized to docking operations.

Attendance declaration

The undersigned Prof. ..... declares that the doctoral student ....., student code (matricola) ..... has been attending the course of..... activated by the University of ..... for the PhD Course in .....

Periodic signatures for stating the course attendance:

Date	Lecturer signature	Date	Lecturer signature

Passed exam form

The undersigned Prof. ..... states that the doctoral student ....., student code (matricola) ..... has positively passed the exam of the ..... course, with a grade …… (A: excellent, B: very good, C: good, D: acceptable).

Type of exam:

[ ] written test

[ ] colloquium

[ ] project work

[ ] seminar held in foreign language (not Italian)

[ ] academic lecture

[ ] other (please, specify): .....

The course is:

[ ] activated by the STMS PhD Course

[ ] activated by the doctoral Course of .....

[ ] activated by the bachelor/master Course of .....

[ ] other (please, specify): .....

The duration in hours is.....

Having passed this exam / Having attended this seminar, the student acquires ..... credits (either ECTS or CFU).

Date: .....

Signature.....

CISAS G. COLOMBO	**UNIVERSITY OF PADOVA** **PhD Course in Sciences, Technologies and Measurements for Space**

Request of authorization for making paid activity (didattica integrativa, tutoring, external job)

To the STMS PhD Course Board

The undersigned ……., enrolled at the Sciences, Technologies and Measurements for Space - STMS PhD Course,

- Cycle no. …….. (year …….)
- Curriculum: ☐MMIS/MMES ☐ STASA
- Supervisor: prof. ……
- Type of grant: ……

Requests the authorization for the following external activity:

1) Didattica integrativa, *in case of winning of the selection*
- Max. hours normally allowed in a course year: 40;
- hours **already authorized** in **this** academic year ……;
- hours for which this request is presented: ……

2) Other activities funded by UniPD, *in case of winning of the selection* (e.g., Tutor Junior: specify)
……

3) Other external activities (*if the activity foresees a call for the selection, in case of winning of the selection*)
Institution/Company: …… Country: ……..
Full Address: ……..

FOR ALL THE ACTIVITIES: in the following period: from (date) ……/……/…… to (date) ……/……/……
Short description of the activity (**if "didattica integrativa" you must specify: Course title, Corso di Laurea/Laurea Magistrale and professor**):……
Type of contract (only for ***3) Other external activities***) ……..

I hereby declare that the income related to the external activity does not entail the overcoming of the income limits imposed by PhD regulations.
Doctoral student (signature) …… *date* ……/……/……

I hereby declare that the external activity does not interfere with the Training and Research Activity of the Student, as per Analytical Report and Personal Training Plan approved by (or which will be presented to) the PhD Course Board.
Approved by the Supervisor (signature) ……

I hereby declare that the external activity is consistent with respect to the activities carried out by the Student within the PhD Course (from 38th cycle).
Approved by the Supervisor (signature) ……

The signed document must be scanned and sent as a PDF file to:
- ☑ **dottorato.cisas@unipd.it**
- ☑ **to the Supervisor in cc**

CISAS G. COLOMBO	**UNIVERSITY OF PADOVA** **PhD Course in Sciences, Technologies and Measurements for Space**

PERSONAL TRAINING PLAN OF DOCTORAL STUDENT XXX YYY

EDUCATIONAL ACTIVITIES ACTIVATED BY THE STMS PHD COURSE						
Interdisciplinary Module/Activity or III level University module	**Lecturer**		**Frequency (YES/NO)**	**Exam (YES/NO)***	**Date of exam**	**Attained credits**
Curriculum oriented seminars	**Lecturer**		**Frequency (YES/NO)**	**Exam (YES/NO)***	**Date of exam**	**Attained credits**
			Total of credits attained in educational activities (at date DD MM YYYY):			

Request of authorization for spending periods outside Padova University

To the STMS PhD Course Board

The undersigned doctoral student …….. of the Sciences, Technologies and Measurements for Space - STMS PhD Course,

- Cycle no. …….. (year …….)
- Curriculum: ☐MMIS/MMES ☐ STASA
- Supervisor: prof. …….
- Type of grant: …….

requests the authorization for spending a period outside Padova University in the following period:
from (date) ……/……/…… to (date) ……/……/…… (total: …….. days), to be carried out at
Institution / Company: …… Country: ……..
Full Address: ……..

I hereby declare that
☐ I already spent a period of …….. days outside Padova University within the PhD;
☐ I have not spent any periods outside Padova University within the PhD so far

and the total period outside Padova University (**including former periods and current request**)
☐ does NOT exceed six months (180 days)
☐ exceeds six months (180 days)

Short description of the activity to be carried out:
……
……
……

Doctoral student (signature) …….. *date* ……/……/……

Approved by the Supervisor (signature) ……

The signed document must be scanned and sent as a PDF file to:

- ☑ **dottorato.cisas@unipd.it**
- ☑ **to the Supervisor in cc**

[The invitation (letter or e-mail) by the hosting institution is attached.]

Extract from the University Regulations on Doctoral Thesis

TITOLO VII
Conseguimento del titolo

Art. 31 - Valutazione della tesi e ammissione all'esame finale

1. I risultati dell'attività di ricerca devono essere esposti in un lavoro finale di tesi che ne evidenzi l'originalità e la rilevanza scientifica.
2. La tesi può essere redatta in lingua italiana o inglese, o in altra lingua straniera previo consenso del Collegio dei docenti. La tesi è corredata da una sintesi che deve essere in inglese.
3. Sulla tesi esprimono il loro giudizio, entro 30 giorni dal ricevimento della tesi, due valutatori esterni, di cui almeno uno è un docente universitario. Possono assumere la funzione di valutatori:
- docenti esterni all'Ateneo e agli Atenei convenzionati, che concorrono al rilascio del titolo di Dottorato;
- esperti di elevata qualificazione appartenenti ad enti di ricerca pubblici o privati non convenzionati con il dottorato;
- esperti di elevata qualificazione appartenenti ad enti di ricerca pubblici o privati convenzionati con il dottorato, limitatamente alle sedi non oggetto della convenzione.

Tutti i valutatori non devono essere membri del Collegio docenti del corso di dottorato.
4. Il Collegio docenti, entro 15 giorni prima della conclusione del percorso dottorale, valuta l'attività complessiva svolta nel percorso dottorale e riassunta nella relazione del dottorando esprimendo il proprio giudizio ai fini dell'ammissione alla valutazione della tesi da parte dei valutatori.
5. Ai valutatori verranno resi disponibili in formato digitale tramite apposita piattaforma informatica:
   a) la tesi;
   b) il giudizio del Collegio dei docenti;
   c) una relazione del dottorando stesso sulle attività svolte durante il dottorato e sulle eventuali pubblicazioni.
6. Al fine di ottemperare a quanto previsto dall'art. 8 del D.M. 226/2021, il competente Ufficio di Ateneo coordina una procedura atta a raccogliere i corrispondenti giudizi dei due valutatori esterni che possono proporre l'ammissione alla discussione pubblica o il rinvio per un periodo non superiore ai sei mesi se ritengono necessarie significative integrazioni o correzioni. Lo stesso Ufficio provvede ad attivare la successiva valutazione di una commissione di esame finale salvaguardando la possibilità del dottorando di poter riformulare la tesi di dottorato in caso di rinvio richiesto dai valutatori.
7. L'esame finale consiste nella discussione della tesi di dottorato dinanzi alla Commissione di cui all'art. 33.
8. L'eventuale rinvio da parte dei valutatori o la proroga di cui all'art. 22 comma 8 del presente regolamento, non danno titolo alla fruizione della borsa di studio e non comportano alcun onere economico per l'Università degli Studi di Padova e eventuali obblighi di natura assicurativa saranno a carico dell'interessato.

Art. 32 - Commissioni

1. La nomina della Commissione giudicatrice è disposta con decreto del Rettore su proposta del Collegio dei docenti.
2. Il Collegio dei docenti, ove ne ravvisi la necessità, potrà segnalare più Commissioni in considerazione dei diversi percorsi formativi e di ricerca dei candidati. Le Commissioni di norma non potranno comunque essere più di una per curriculum attivato per il ciclo che si conclude.
3. Le dimissioni dei componenti delle Commissioni devono essere motivate.
4. La Commissione giudicatrice è tenuta a concludere le valutazioni entro la fine della sessione per la quale è stata nominata. Decorsi i termini suddetti, la Commissione che non abbia concluso i suoi lavori decade e si dovrà procedere nuovamente alla nomina della Commissione con Decreto del Rettore.
5. La Commissione giudicatrice di esame finale sarà composta da un minimo di tre a un massimo di cinque membri effettivi e altrettanti supplenti, nel rispetto, ove possibile, dell'equilibrio di genere. La commissione è composta per almeno due terzi da soggetti non appartenenti alla sede amministrativa del corso e per non più di un terzo da componenti appartenenti ai soggetti partecipanti al dottorato in forma associata. In ogni caso la commissione è composta per almeno due terzi da componenti di provenienza accademica. Dalla Commissione sono esclusi i supervisori e i co-supervisori dei dottorandi nonché il referente membro del Collegio, nel caso in cui il Supervisore e il Co-supervisore siano esterni, salvo diverse previsioni contenute in specifiche convenzioni relative all'internazionalizzazione.
6. La Commissione, con voto unanime, ha facoltà di attribuire la lode in presenza di risultati di particolare rilievo scientifico.

Art. 33 - Esame finale

1. La domanda ammissione all'esame finale deve essere presentata dal dottorando utilizzando l'apposita procedura on line entro i termini e le modalità stabilite dall'Ateneo. Al momento dell'inoltro della domanda di esame finale, i dottorandi dovranno essere in regola con il pagamento delle tasse di iscrizione per la durata del corso, pena la mancata ammissione.
2. La domanda di ammissione all'esame finale deve essere corredata:
a) da un esemplare della tesi in formato digitale per il deposito presso l'archivio dell'Ateneo che ne garantisce la conservazione e la pubblica consultabilità. Lo stesso deposito è funzionale anche ai fini di adempiere all'obbligo di deposito della tesi presso le biblioteche nazionali di Roma e Firenze. In caso di richiesta di revisioni da parte dei valutatori la tesi definitiva deve essere depositata secondo i tempi e le modalità annualmente stabilite dall'Ateneo;
b) da una relazione del dottorando sulle le attività svolte e le eventuali pubblicazioni redatta in lingua italiana o inglese.
4. Al fine del deposito e dell'invio ai Commissari la tesi deve essere confermata nella procedura on line dal Supervisore, o dal Coordinatore in caso di assenza o di impedimento del Supervisore.
5. La data e il luogo d'esame verranno comunicati per via telematica ai dottorandi.
6. Al termine della discussione, la tesi, con motivato giudizio scritto collegiale, è approvata o respinta.
7. La discussione della tesi, su richiesta motivata dei commissari e/o del candidato, può avvenire in video conferenza secondo le modalità comunicate dal competente Ufficio.
8. Al dottorando che abbia superato l'esame finale verrà attribuito il titolo di dottore di ricerca e verrà in tal senso rilasciato un diploma che riporterà la dicitura del Corso e dell'eventuale curriculum frequentato. Le attività formative svolte dai dottorandi in una o più sedi sono certificate da un documento allegato al diploma finale (diploma supplement).

Art. 34 - Assenza all'esame finale

1. L'assenza viene considerata giustificata, a fronte di una idonea documentazione, nelle seguenti ipotesi:
   a) malattia;
   b) caso fortuito o forza maggiore.
2. In tali casi, i dottorandi interessati possono chiedere al Rettore, entro 30 giorni successivi alla data fissata per l'esame finale, di poter sostenere l'esame in altra data.
3. Nel caso in cui la sessione sia terminata e la Commissione decaduta, il Rettore, tenuto conto delle particolari circostanze che hanno precluso al dottorando la discussione della tesi di Dottorato, su proposta del Collegio dei Docenti, nomina apposita Commissione confermando la precedente composizione o modificandola.

Analytical report of the doctoral activities

RESEARCH TITLE (THESIS): .....

DOCTORAL STUDENT: .....
e-mail address: .....

CURRICULUM
[ ] Mechanical Measurements for Engineering and Space (MMES)
[ ] Sciences and Technologies for Aeronautics and Satellite Applications (STASA)

TYPE OF GRANT
[ ] University grant
[ ] Other funding source, free research project. Specify the funding source: .....
[ ] Other funding source, specific research project. Specify both the funding source and the research project: .....
[ ] No grant

SUPERVISOR: ..... **CO-SUPERVISOR**: .....

DEPARTMENT (INSTITUTE) OF PhD SUPERVISOR: .....

EVENT:
[ ] Presentation of the proposed research program
[ ] Request of admission to the second year of the PhD Course
[ ] Request of admission to the third year of the PhD Course
[ ] Request of admission to the thesis evaluation procedure

RESEARCH OBJECTIVES AND INTERNATIONAL FRAMEWORK
Description of the objectives of the research and of the international framework (**one page maximum**)

REPORT ON THE ACTIVITIES PROGRAM (description of what has been done and analysis of what has to be done)
First and second year doctoral students: description of the activities done during the last year (**one page maximum**). Third year doctoral students: description of the activities done during the whole three-year period (**two pages maximum)**.
Work Breakdown Structure of the research/educational program done and/or foreseen: **a) level 1 for the presentation of the research program; b) level 2 for admission to the second year; c) level 3 up for other admissions**. Any Work Package (WP) has to be suitably described. Also the time distribution (man-hours, 1500 per year) has to be indicated per each WP and for the educational activities (750 hours total).
GANNT bar-chart of the activities program done and/or foreseen, in agreement with the WBS: **a) for the presentation of the research activity a 3-month time scale at the first year, and 6-month time scale at the following two years is required; b) for the admission to the second and third year, a 3-month time scale is required**.

NATIONAL AND INTERNATIONAL COLLABORATIONS
List of the collaborations done and/or foreseen

INDUSTRY COLLABORATIONS
List of the collaborations with industry done and/or foreseen

PERIODS SPENT ABROAD
List of the period spent outside of Italy related to the research activity. Specify location and duration.

FORESEEN AND ACTUAL RESEARCH PRODUCTS

[ ] new equipment
[ ] new know-how
[ ] publications
[ ] new process
[ ] new methods
[ ] spin-off(s)

PUBLICATION LIST

List of papers published or submitted since the start of the PhD.

PERSONAL TRAINING PLAN

Attach here the personal training plan (from the end of the first year). Describe in this section how it is planned to recover possible delays with respect to the foreseen plan.

ORCID (since the beginning of the first year): ……

SUPERVISOR APPROVAL

The supervisor, Prof. ..... approves this analytical report of the activities program and the related Personal Training Plan, if foreseen.

[NB: For the presentation of the proposed research program this line has not to be filled in, because the supervisor has not been officially assigned yet]

Signatures:

……..... ……

Doctoral student Supervisor

Evaluation of the doctoral student *Name Surname* for the admission to the thesis evaluation procedure

(a) Synthesis of PhD activities

Thesis Title: ……

List of attended educational Course activities and of passed exams:

……

List of attended Conferences, Schools, International meeting:

……

Periods spent outside Italy:

……

List of publications:

……

Research outputs (i.e. new equipment, processes, know-how, methodologies, spin-offs, …):

……

Other scientific/academic/industrial commitments during the PhD period:

……

Evaluation of the doctoral student *Name Surname* for the admission to the thesis evaluation procedure

(b) Supervisor evaluation and PhD Course Board Approval

(NB to be filled in by the Supervisor)

Evaluation of the Thesis Work:

…….

Evaluation of the doctoral student attitude about possible future activities in an academic or non-academic environment

…….

Other comments:

…….

The Supervisor: Prof. *Name Surname*

The Course Coordinator: Prof. *Name Surname*

Approved by the PhD Course Board on: .... *(type the date of the Course Board admission meeting)*

Al Servizio di Medicina Preventiva
dei Lavoratori Universitari Università degli Studi di Padova
Via Marzolo 3/A

D I C H I A R O

Ai sensi e per gli effetti delle disposizioni contenute nel D. Lgs. 81/08, che il sig./ra:

Cognome …….. **Nome**……..……..……

Nato a …… **il** …….. **tel**. .....

in qualità di: docente/ricercatore/professore❑ - tecnico/amministrativo❑ - dottorando❑ - specializzando❑ - assegnista❑ - laureando*❑ - borsista❑ - tirocinante❑ ospite❑ - altro .....❑

afferente alla struttura: codice …… **denominazione**
……
(Dip./ Centro /Servizio ecc.)

***Data inizio attività**: ...../...../..... **Data di prevista cessazione:** ...../...../.....*

**** in particolare per gli studenti in tesi*** -
Laureando del Corso di Studi in: …….....
Relatore:…….……

INDIVIDUAZIONE DEI LUOGHI E/O DELLE AREE SEDE DI LAVORO
(Per l'identificazione fare riferimento ai codici GEOTEC contenuti nelle planimetrie ufficiali di Ateneo)

Edificio (denominazione): …….. Edificio (Codice): ……..Piano: ……. Locale. …….
Locale o Laboratorio (Denominazione):…….…….
Struttura: (denominazione): …… (codice):……. *(Se diversa da quella di afferenza - Dip./ Centro /Servizio ecc.)*
Responsabile del laboratorio: ……..…

GLI SPAZI COMPRENDONO (contrassegnare con X):

Ufficio/studio – Biblioteca e/o archivio - Laboratorio meccanico / officina / falegnameria - Laboratorio Chimico - Laboratorio biologico - Laboratorio informatico - laboratorio con presenza di apparecchiature radiogene o sostanze radioattive - Campi, boschi, terreni – Ambulatorio - Sala Operatoria – Degenza - altro …….

TIPOLOGIA DI RISCHIO (contrassegnare con X):

Movimentazione manuale dei carichi - Videoterminale (> 20 ore/settimana) – Rumore – Vibrazioni – Campi elettromagnetici - Radiazioni ottiche artificiali - Agenti chimici - Agenti cancerogeni e mutageni*** *(dati da specificare nella tabella allegata)* □ – Agenti biologici gruppo 1 e 2 □ - Agenti biologici gruppo 3 e 4 ***(dati da specificare nella tabella allegata)* - MOGM □ - Rischio Elettrico - Rischi attrezzature – Radiazioni ionizzanti - Altro ……

****Dati Agenti biologici utilizzati (gruppo 3 e 4)**

Agente Biologico	Attività Svolta (in breve)	Gruppo (3 o 4)

*****Dati Sostanze cancerogene o mutagene utilizzate (R45;R46;R49, H340, H341, H350, H351)**

Sostanza o Miscela	N°CAS	Stato Fisico	Concentrazione

Data _____ Firma Responsabile/Referente _____

Timbro Dipartimento _____ Firma del Direttore _____

Request of authorization for carrying out off-site the PhD research activity

The doctoral student Name Surname of NNN cycle MMES/STASA curriculum asks to the PhD Course Board the authorization to carry out his/her PhD research activity at the Institute/University in City (State).
The motivations for this request are the following: …….

The doctoral student supervisor, Prof. Name Surname, supports this request.
Signature: *Name Surname*

Date: DD MM YYYY

Signature of the doctoral student: *Name Surname*

Richiesta di autorizzazione allo svolgimento di attività di ricerca fuori sede

Lo/a studente/ssa di dottorato Nome Cognome del NNN ciclo, curriculum MMES/STASA chiede al Collegio del Corso l'autorizzazione a svolgere la propria attività di ricerca di dottorato presso Istituto/Università a Città (Stato).
Le motivazioni di questa richiesta sono le seguenti: ……

Il supervisore, Prof./Prof.ssa Nome Cognome, approva questa richiesta.
Firma: *Nome Cognome Surname*

Data: GG MM AAAA

Firma della/del dottoranda/o: *Nome Cognome*

Request of authorization for association

I undersigned *Name Surname*, doctoral student of *Number* cycle Curriculum *MMES/STASA*, ask to the PhD Course Board the authorization to get associated to ..... The motivations for this request of association are the following: ……..

My supervisor, Prof. *Name Surname*, approves.
Signature: *Name Surname*

Date: DD MM YYYY Signature of the doctoral student: *Name Surname*

Il/La sottoscritto/a dottorando/a *Nome Cognome* del *NNN* ciclo, curriculum *MMES/STASA* chiede al Collegio del Corso l'autorizzazione ad associarsi a .....Le motivazioni per questa richiesta di associazione sono le seguenti: ……..

Il mio supervisore, Prof./Prof.ssa *Nome Cognome*, approva.
Firma: *Nome Cognome*

Data: GG MM AAAA Firma della/del dottoranda/o: *Nome Cognome*

CISAS G. COLOMBO	**UNIVERSITY OF PADOVA** **PhD Course in Sciences, Technologies and Measurements for Space**

Evaluation of the STMS PhD Course

QUESTIONNAIRE

1. What was the relevance of the PhD STMS Course imagined when registering for the course for your future career? (Enter a number in the scale of 0 to 10 where 0 means it is a doctorate as others, and 10 indicates extremely relevant)
2. Has the Course met your initial expectations? (Give a number between 0 and 10 where 0 means “not at all”, and 10 means “completely”)
3. How would you rate the supervision and/or assistance of your supervisor? (Give a number between 0 and 10 where 0 is “non-existent” and 10 being “excellent”)
4. How would you rate the relationship with doctoral students implemented by the Course Coordinator? (Give a number between 0 and 10 where 0 means “unacceptable” and 10 being “excellent”)
5. Having in mind the number of 750 hours in three years to devote to educational training program (number set by the Ministry of Education for a doctoral class), how do you assess the course structure adopted by the Course (mandatory lectures, curriculum dedicated courses, seminars, etc.)? (Give a number between 0 and 10 where 0 is “too rigid and unsustainable” and 10 being “excellent”)
6. How do you rate the lessons of Course teachers, on average? (Give a number between 0 and 10 where 0 means “totally useless” and 10 being “excellent”)
7. How do you rate the degree of interdisciplinary educational activities offered by the Course? (Give a number between 0 and 10 where 0 is “non-existent” and 10 being “high grade”)
8. How do you rate the significance of the course exams? (Give a number between 0 and 10 where 0 means “irrelevant” and 10 means “very adequate”)
9. Have you had difficulty in disposing of tools, equipment and bibliography necessary for the development of the thesis? (Give a number between 0 and 10 where 0 means “too much” and 10 means “none”)
10. What is your level of satisfaction with the mobility funds made available by the research group you belong to? (Give a number between 0 and 10 where 0 means “completely dissatisfied” and 10 means “very satisfied”)
11. Write any comment you feel important to improve the Course (continued on the back, max 1 page)

CISAS G. COLOMBO	**UNIVERSITY OF PADOVA** **PhD Course in Sciences, Technologies and Measurements for Space**

Evaluation of the Course on …….

QUESTIONNAIRE

1. What was the expected relevance of the course (Enter a number in the scale of 0 to 10 where 0 means no relevance, and 10 indicates extremely relevant)

2. Has the course met your initial expectations? (Give a number between 0 and 10 where 0 means “not at all”, and 10 means “completely”)

3. How do you rate your personal interest for the course? (Give a number between 0 and 10 where 0 is “no interest” and 10 being “extreme interest”)

4. How would you globally rate the teacher(s) of the course? (Give a number between 0 and 10 where 0 is “not at all competent” and 10 being “excellent”). Please, provide a comment to your evaluation

   Teacher 1:

   Teacher 2 (if foreseen):

   Teacher 3 (if foreseen):

5. Was the provided didactical material (slides, lecture notes, etc.) adequate to the course? (Give a number between 0 and 10 where 0 means “irrelevant” and 10 means “very adequate”)

6. Was the course timetable adequate? If not, please justify your answer

7. Write any comment you feel important to improve the course