

Guidelines of the PhD Course in Industrial and Information Engineering

Department of Engineering - University of Perugia

Approved by the Doctoral Board on 10/09/2024

Parte I – General Rules

Art. 1. Scope of Application

These Guidelines (GLs) supplement the Regulation of the PhD Courses of the University of Perugia issued by Rectoral Decree (D.R.) no. 620/2022 of 11 March 2022 (hereinafter referred to as "Regulation of the University Doctoral Courses") and regulates the objectives, articulation, organizational structures, operation, and organization of the educational offer of the PhD Course in Industrial and Information Engineering.

Art. 2. Approval and Amendment of the Guidelines

These GLs are proposed by the Doctoral Board of the PhD Course in Industrial and Information Engineering, and they are approved by the Department of Engineering Council. Any modification of the GLs is proposed by the Doctoral Board with a resolution approved by a simple majority of those entitled.

Art. 3. Objectives and Articulation of the PhD Course

In addition to the general aims of the doctoral courses (reported in the Regulation of the University Doctoral Courses), the PhD Course aims to study and develop new models, methods, and technologies for the scientific-disciplinary sectors of industrial and information engineering, through a highly qualifying training course, which allows PhD students to achieve autonomous research skills of international level. The training and research activities are articulated into distinct *curricula*, which refer to one or more scientific-disciplinary sectors characterizing industrial and information engineering, as reported in the accreditation form of each activated cycle.

Part II – Organizational Structures and Operation

Art. 4. Administrative Bodies of the PhD Course

The administrative bodies of the PhD Course are the *Doctoral Board* and the *Coordinator*. The functions of these bodies are regulated by Arts. 9, 10, 11, and 12 of the Regulation of the University Doctoral Courses.

Art. 5. The Doctoral Board

This article integrates Arts. 9 and 10 of the Regulation of the University Doctoral Courses.

1. Composition. The Doctoral Board is composed of full and associate professors, university researchers, and two representatives of the PhD students, elected from among all those enrolled in the PhD Course (paragraph 5 of this article). These representatives participate in the meetings of the Doctoral Body with an advisory function for the discussion of the didactic and organizational problems of the Course; they shall not participate in the discussions and deliberations concerning the annual evaluation of the PhD students and the organization of the final examination. Please refer to art. 9 of the Regulation of the University Doctoral Courses for further details and constraints on the composition of the Doctoral Board.
2. Affiliation of new members. The requirements for participation in the Doctoral Board of researchers, professors, or experts not belonging to universities or public research bodies are defined in art. 9 of the Regulation of the University Doctoral Courses. The new requests for affiliation must be submitted to the Board by February 15 of each year and will be evaluated by the Board before the activation of each cycle, considering the ANVUR requirements, the scientific criteria provided for by the University Regulations and the ministerial rules, also with reference to the criteria and indicators for the distribution of the MUR Post-Graduate Scholarship Fund. The new members admitted to the Board, by resolution of the Department Council, will be officially affiliated to the Board at the beginning of the new doctoral cycle, subject to the accreditation of the PhD Course.
3. Functions. The functions of the Doctoral Board are regulated by art. 10 of the Regulation of the University Doctoral Courses. Professors, researchers, and experts in the scientific-disciplinary sectors referred to in art. 3 of these GLs can be invited to attend the meetings of the Board and they can be appointed as co-advisors of doctoral students.
4. Referents of the curricula. According to art. 9, paragraph 11 of the Regulation of the University Doctoral Courses, the Doctoral Board appoints a Referent for each of the curricula referred to in art. 3 of these GLs. This Referent has the task of organizing and coordinating the training activities, proposing to the Doctoral Board the measures relating to the individual doctoral students, organizing the tutoring activity, taking care of the progress of the PhD students, to ensure that everyone acquires the methodological tools related to her/his research area.
5. Election of the representatives of the PhD students.
 - a. The Coordinator calls for elections for the renewal of the representatives of the PhD students in the two months prior to the expiry date of the mandate of the representatives in office. The electoral calendar, the number of eligible candidates, the place where the elections are held and the deadline for the presentation of the candidates, set at least ten working days before the date of the elections, are reported in the call for election. The elections take place in a single day.
 - b. The active and passive electorate is made up of all students regularly enrolled in the PhD Course in the academic year during which the elections are held. Applications must be received in writing or by e-mail by the Coordinator, by 12:00 on the last day. The Coordinator verifies the regularity and validity of the applications, and announces the list of candidates by publication on the website of the Department of the course or by e-mail to all the active electorate and to the Doctoral Board. Each candidate may withdraw his/her candidacy by 12:00 on the day before the date of the elections, by sending a written communication or an e-mail to the Coordinator.

- c. The Coordinator appoints the commission, consisting of two professors or researchers, one of whom with the function of President, and a doctoral student who is part of the active electorate and not a candidate.
- d. The elections are held by secret ballot and each student can express up to two preferences. The elections are valid with a number of voters equal to at least one third of those entitled. If the quorum is not reached, new elections will be called within 7 days.
- e. Upon completion of the elections, given the achievement of the quorum, the Coordinator proclaims the candidates who have obtained the highest number of votes, advertising them on the website of the Department of the Course or by e-mail communication to the whole active electorate and to the Doctoral Board. In case of a tie between two or more candidates, the one who has the greatest seniority of enrollment in the PhD Course is elected, and even if the seniority of enrollment is equal, the oldest in age is elected. The term of office of those elected is two years, renewable once consecutively. In the event of renunciation of the appointment or loss of the status of eligibility of one of the elected representatives, the first of the non-elected ones takes over for the remaining term of the mandate. If this is not possible, new elections are held within 30 days.

Art. 6. The Coordinator of the PhD Course

This article integrates the content of Arts. 11 and 12 of the Regulation of the University Doctoral Courses, which regulates the office of Coordinator of the Doctoral Program and the related functions.

1. The Coordinator is a full-time full professor or, in case of justified unavailability, a full-time associate professor who is a member of the Doctoral Board. The Coordinator remains in office for three years and can be reconfirmed only once. The appointment and replacement of the Coordinator are ratified by the Department Council by an absolute majority, on the designation of the Doctoral Board (paragraph 3 of this article).
2. The Coordinator calls the meetings of the Doctoral Board at least 5 days in advance. The meetings are valid when half plus one of the members of the Board are present, after deducting justified absences. At the beginning of each session, the Doctoral Board appoints a secretary, who has the function of assisting the Coordinator in drawing up the minutes of the session.
3. Designation of the PhD Coordinator.
 - a. The designation of the new PhD Coordinator takes place following the natural expiration or early termination of the mandate of the Coordinator in office.
 - b. The Dean of the full professors of the Doctoral Board (or in case of his/her absence or impediment, the full professor of the Doctoral Board who follows him/her in order of seniority in the role) collects the applications in the 60 days prior to the natural expiry of the mandate of the Coordinator in office, or within 60 days in case of early termination of the mandate.
 - c. The Dean verifies the regularity and validity of the applications, and announces the list of candidates by publication on the Web site of the Department of the course or by e-mail to all members of the Doctoral Board.
 - d. If there are more candidates, the Dean calls for the voting by secret ballot, which will take place in a meeting of the Doctoral Board. All members of the Doctoral Board can vote. Each candidate may withdraw his candidacy, by communicating in writing to the Dean (also by e-mail), by 12:00 on the day prior to the voting date.

- e. The polling committee is composed of three members appointed by the Dean, who also identifies the President, the secretary, and the scrutineer. Voting takes place by secret ballot. Each voter can express only one preference.
- f. For the votes to be valid, it is required the participation of the absolute majority of those entitled to vote in the first round of voting and at least one third of those entitled to vote in the second round of voting. In the event of a failed election, a run-off is held between the two candidates who received the highest number of votes in the last ballot. The candidate receiving the majority of votes is elected. In case of a tie, the candidate with the longest seniority in the role is elected and, in case of a further tie, the younger is elected.

Art. 7. Internal Evaluation

Based on art. 10 of the Regulation of the University Doctoral Courses, the Doctoral Board presents to the Department an annual report on the progress of the Doctoral Course, which considers in particular training processes carried out and their compliance with the pre-established objectives, also in relation to employment opportunities consistent with the level of training acquired, as well as the objectives planned for the following year.

Art. 8. How to Access the PhD Course

For anything omitted in this article, refer to Arts. 13, 14, 15, 16, and 17 of the Regulation of the University Doctoral Courses.

1. Access to the Research Doctorate Course in Industrial and Information Engineering takes place with a public selection procedure. Art. 14 of the Regulation of the University Doctoral Courses specifies the requirements for accessing the Course.
2. Participation in the selection procedures requires the submission of an application in response to the call for applications for admission to PhD courses. Refer to Arts. 14 and 15 of the Regulation of the University Doctoral Courses for the regulations relating to the selection notice and the submission of the application.
3. The definition of the Selection Boards for carrying out the selection procedures is governed by art. 15 of the Regulation of the University Doctoral Courses.
4. To ensure a complete evaluation of each candidate, the selection procedure can be carried out in one of the following ways, based on what is established by the Doctoral Board for each selection round:
 - a. Evaluation of qualifications (on a scale of 30);
 - b. Evaluation of qualifications and written test (on a scale of 60: 30 + 30);
 - c. Evaluation of qualifications and interview (on a scale of 60: 30 + 30);
 - d. Evaluation of qualifications, written test and interview (on a scale of 90: 30 + 30 + 30).
5. Based on art. 16 of the Regulation of the University Doctoral Course, the evaluation of qualifications must concern the university training course, as well as any further training courses and professional and research experiences, and any scientific publications. The degree thesis can be considered in the evaluation of qualifications. The evaluation of qualifications may also concern the elaboration by the candidates of a research project to be developed over the three years of the PhD Course on one of the topics indicated in the call for applications. The evaluation, out of thirty, is accompanied by a reasoned judgement.

6. The interview can be held via videoconference and can be held in Italian or English, depending on the candidate's choice. If taken in Italian, the interview also includes the assessment of knowledge of the English language, through the reading and understanding of a text.
7. If the call for applications reserves some quotas for students graduated from foreign universities, for fellows from foreign countries, or for specific international mobility programs, including holders of research grants financed by the European Union or by other international scientific institutions, the selection procedures for assigning these quotas are carried out as for the assignment of the non-reserved quotas.
8. If the call for applications reserves some quotas for employees of companies in agreement (industrial doctorate or doctorate in higher apprenticeship), the selection procedures for assigning these quotas are carried out as for the assignment of the non-reserved quotas. In the case of other types of doctorates (Marie/Curie, foreign scholarship holders, etc.) the selection procedures are usually governed by specific agreements.
9. At the end of the selection procedures, admission to the Course takes place based on the provisions of art. 17 of the Regulation of the University Doctoral Courses.

Part III – Organization of the training activities and achievement of the title

Art. 9. Start of the Course and Assignment of the Advisor

1. The PhD Course usually starts after the opening of the academic year and, in any case, after the completion of the selection procedures for accessing the Course.
2. Following the appointment of the winners of the selection procedures, the Doctoral Board indicates an Advisor for each PhD student, also based on the scientific interests of the PhD student. The Advisor will supervise the doctoral theses, proposing a field of research to their PhD students, which will be submitted for approval by the Doctoral Board within four months from the beginning of the Course. The Advisor is chosen from among the members of the Doctoral Board.
3. Upon request of the PhD students and/or the Advisor, the Doctoral Board may assign to the PhD student one or more co-Advisors, chosen from among the experts of the chosen research sector and not necessarily members of the Doctoral Board. Each co-Advisor can supervise the doctoral thesis.

Art. 10. Training Credits and Activities of the PhD Students

The training project of the PhD student is defined in accordance with the guidelines published by the University of Perugia for PhD courses. This project is divided into three main types of activities:

- a) *Research activities*: development of an individual research program, referring to a specific disciplinary area among those on which the PhD Course is focused. The research activity takes place under the guidance of one or more supervisors, based on the provisions of art. 9 of these GLs. The research activity does not contribute to the acquisition of CFU (University Educational Credits).

- b) *Teaching activities*: attendance of doctoral level teaching activities, according to the indications of the Academic Board, in accordance with what is specified in Table 1 of this document. The teaching activity contributes to the acquisition of CFU (University Educational Credits), must be clearly distinct from that taught in the first and second level degree courses, and must be strictly functional to the research activities envisaged by the PhD Course.
- c) *Other training activities*: these are complementary training activities that contribute to the student's training. These activities do not contribute to the acquisition of CFU (University Educational Credits).

The activities listed above are further detailed in the art. 11, 12 and 13 of these GLs.

Art. 11. Research Activities

The research activity of the doctoral student allows the acquisition of specialized scientific skills, and includes assisted research activities, with the publication of innovative contributions in conferences and scientific journals, as well as the drafting of the doctoral thesis. It also includes a period of scientific activity at other universities or research centers, usually abroad.

Art. 12. Teaching Activities

The teaching activity includes the attendance of the following types of training activities.

- *Doctoral Modules* provided (preferably in English) by this PhD Course or by other PhD Courses (types A and B of the University guidelines), for a total of at least 15 CFU: 1 CFU for every 6 hours of lectures (1.5 CFU for every 6 hours for teaching provided by foreign PhD Courses). Remote attendance is allowed, and an assessment based on a final exam in presence must be provided.
- *Multi/inter/trans-disciplinary modules* provided by the University or by another PhD Course (type C of the University guidelines), for a total of at least 6 CFU: 1 CFU every 6 hours of lectures.
- *Congresses, seminars, and doctoral schools* (type D of the university guidelines), for a total of at least 9 CFU:
 - doctoral schools: 1 CFU every day
 - international conferences: 1 CFU every day
 - national conferences: 0.5 CFU every day
 - seminars: 1 CFU every 6 hours
 - seminars abroad attended in person: 1.5 credits every 6 hours

Art. 13. Other Training Activities

The other training activities that contribute to the training of the PhD student must be approved by the Academic Board within the deadline established by art. 10, paragraph 2, letter e) of the University Regulations for PhD Courses. Training activities may include:

- supplementary teaching, up to a maximum of 40 hours per academic year and subject to a resolution of attribution by the Department Council,

- activities as an “expert in the subject”, with appointment pursuant to the current University Regulations,
- tutoring by the call for applications, checked by the competent University Offices,
- tutoring for students of bachelor's and master's degrees, checked by the supervisor,
- presentation of scientific acts,
- journal club

The above training activities do not contribute to the achievement of CFU, but are recorded in the doctoral student's curriculum.

Art. 14. Temporal Sequence of the Teaching Activities

Table 1 reports the articulation of the teaching activities of the PhD student (arts. 10 and 12) in the three years of the course. For each year, the minimum number of credits expected is indicated. The distribution of the expected credits on the individual types of teaching activities for each year of the course may vary, but the minimum limit of credits provided for each type of activity must be respected, based on what is specified in art. 10 of these GLs. See also art. 16 about any educational debt that each doctoral student can accumulate at the end of the first and second year of the course.

Type of activity	Expected CFU		
	I Year	II Year	III Year
<i>Doctoral modules</i>	9	6	
<i>Multi/inter/trans-disciplinary modules</i>	2	2	2
<i>Congresses, seminars, and doctoral schools</i>	1	4	4
Totals	12	12	6

Tabel 1: Distribution of the minimum credits expected in the three years of the course

Art. 15. Study and Research at Another University or Research Center

1. The PhD student, generally in a period between the second semester of the second year of the Course and the first semester of the third year of the Course, spends a research stay at a university or research center abroad. The institution in which the student carries out this stay is indicated by his/her Advisors among those most qualified in the research field of the student.
2. The duration of the stay is usually no more than 6 months. In duly justified cases, the duration of the stay can be extended up to a maximum of 18 months, subject to the positive opinion of the Doctoral Board.
3. In specific cases (e.g., for students benefiting from an industrial doctorate) or in exceptional cases (e.g., due to health impediments, maternity, paternity, etc.), the training period at universities or research centers abroad can be replaced with a research stay at Italian universities or research centers (different from the University of Perugia), or with other equivalent activities approved by the Doctorate Board.

Art. 16. Evaluation of the Activity and Transition to the Next Years

1. The teaching activities carried out by the doctoral students in the three years of the course are noted in a *booklet*, edited by the doctoral student, the supervisors and under the supervision of the Coordinator.

In particular: (i) the annotations of the doctoral modules, with the relative credits awarded, must be signed by the professors of the aforementioned modules; (ii) participation in seminars, schools, conferences and workshops, with the associated number of CFU, must be signed by at least one of the supervisors of the PhD student. In case the examination of a PhD module is not taken at the University of Perugia, for this module the booklet can be signed by the PhD Coordinator, based on an indication of the module professor, possibly by e-mail.

1. At the end of each year of the Course, the activity carried out by the PhD student is subject to evaluation by the Doctoral Board. On the basis of the outcome of the assessment, the Doctoral Board decides on admission to the following year of the Course for first- and second-year students, and it expresses an opinion on the overall activity for each third-year student, as required by art. 24 of the Regulation of the University Doctoral Courses. More specifically:

- a. By 30 September of the first year of the Course, each PhD student must produce and send to the Coordinator a report on the study and research activity carried out, signed by their Advisors. The report must be in English, according to the specifications in Annex 1 of these GLs. Based on this report and the activities annotated in the booklet, the Doctoral Board will decide on the evaluation of the PhD student, expressing one of the following three outcomes:

- *Full admission*. The PhD student is fully admitted to the second year of the Course; in this case all the CFU expected for the first year are assigned to him/her, based on the activities carried out and reported in the booklet.
- *Admission with debt*. The PhD student is admitted to the second year of the Course with a *Training Debt* (DF). This debt cannot exceed 12 CFU and must be recovered in the second year.
- *Rejection*. The PhD student is not admitted to the second year.

- b. By 30 September of the second year of the Course, each PhD student must produce and send to the Coordinator a report on the study and research activity carried out, signed by their Advisors, which highlights in particular the progress with respect to the activities of the first year. The report must be in English, according to the specifications in Annex 1 of these GLs. The report must also explicitly list the production of PhD student in terms of scientific publications, showing that the PhD student is an author, also in collaboration, of at least one scientific publication related to his/her research topic, in an international journal or conference with documented anonymous review process, indexed in at least one of the Scopus and WoS (Web of Science) databases or related to internationally renowned publishers (e.g., IEEE, Elsevier, Springer, ..). The student will also have to make an oral presentation of about 20 minutes on the content of his/her report; the oral presentation is given in English. Based on the report, the scientific publications, the oral presentation, and the activities reported in the booklet, the Doctoral Board will decide on the evaluation of the student, expressing one of the following three outcomes:

- *Full admission.* The PhD student is fully admitted to the third year of the Course; in this case all the CFU expected at the end of the second year are assigned to him/her, based on the activities carried out and reported in the booklet.
 - *Admission with debt.* The PhD student is admitted to the third year of the Course with a *Training Debt* (DF). This debt cannot exceed 12 CFU and must be recovered in the second year.
 - *Rejection.* The PhD student is not admitted to the third year.
- c. By 30 September of the third year of the course, each PhD student must produce and send to the Coordinator a report on the overall activity carried out in the three years, signed by their Advisors. The report must be in English, according to the specifications in Annex 1 of these GLs. The report must also explicitly list the production of the PhD student in terms of scientific publications, from which one of the following two requirements is satisfied: (i) the PhD student is an author, also in collaboration, of at least three scientific publications related to his/her topic research, in international journals or conferences with documented anonymous review process, indexed in at least one of the Scopus and WoS (Web of Science) databases or related to internationally renowned publishers (e.g., IEEE, Elsevier, Springer, ..); (ii) the student is an author, also in collaboration, of at least two scientific publications that meet the criteria in point (i), but of which at least one is a journal publication in class Q2 or Q1 according to SJR (Scimago Journal & Country Rank - <https://www.scimagojr.com/>), in the year of publication or in the previous one, in one of the subject categories of the journal.

The student will also have to make an oral presentation of about 30 minutes on the overall activity carried out; the oral presentation is in English. Based on the report, the scientific publications, the oral presentation, and the activities reported in the booklet, the Doctoral Board will express a judgment on the overall activity of the PhD student. In accordance with the provisions of art. 24 of the Regulation of the University Doctoral Courses, which sets the deadline for submitting the PhD thesis as October 31st, this judgment is valid both as a presentation to the final exam commission and as an evaluation of the Course's training activities, according to the predefined objectives. The judgment of the Doctoral Board does not prevent the student to participate in the final evaluation and discussion. As established by art. 25 of the Regulation for University Doctoral Courses, to which reference should be made, the opinion of the Doctoral Board is sent, together with the thesis and other documents required, to two internationally renowned evaluators, external to the University of Perugia.

- d. Final thesis and evaluation. In accordance with the provisions of art. 25 of the of the Regulation for University Doctoral Courses, by the end of the third year of the course, the doctoral student must produce an innovative thesis document in the chosen research field, accompanied by a summary report in English. The thesis and the summary report, previously examined by the Doctorate Board, are sent, within the following 15 days, to at least two highly qualified evaluators, also belonging to foreign institutions, outside the University of Perugia and its affiliated universities or institutions. At least one of the evaluators must be a university professor. The

evaluators must not be members of the Doctoral Board of the PhD Course. Within 30 days following receipt of the thesis, the evaluators express a written analytical judgment, proposing admission to public discussion or postponement of this discussion for a period not exceeding six months. Based on the judgments of the evaluators, the Doctoral Board expresses its opinion on the admission of the PhD student to the final exam or on any postponement. After any postponement period, the thesis will be accompanied by a new opinion from the evaluators, and the doctoral student will still be admitted to the public discussion.

Art. 17. Final Examination and Exam Commission

1. The legislation about the execution of the final exam and the achievement of the PhD degree is described in Arts. 26 and 27 of the Regulation of the University Doctoral Courses, to which reference should be made for what is missing in this article.
2. The public discussion of the thesis takes place in front of an exam commission, appointed by decree of the Rector, upon proposal of the Doctoral Board. The commission is composed of three Italian or foreign members, chosen from among university professors specifically qualified in the subject of the thesis. The commission is composed for at least two-thirds of members not belonging to the administrative headquarters of the Course and for no more than one-third of members of the Doctoral Board. At least two-thirds of the commission must be from academia. The commission can be integrated by no more than two experts belonging to public and private research structures, including foreign ones, with specific documented expertise about the subject of the thesis. The evaluators of the thesis cannot participate in the commission.
3. The discussion of the thesis, upon motivated request of the commissioners and/or of the candidate and authorization of the Rector, can take place in video conference.
4. If necessary, the Academic Board may propose multiple commissions in consideration of the different educational paths of the candidates.
5. In accordance with the provisions of art. 19 of the Regulation of the University Doctoral Courses, to obtain the research doctorate title it is also required that the scientific publications of the doctoral student are included in the IRIS catalogue. At the end of the PhD course, the PhD student is also required to complete the online evaluation questionnaire for the course attended.

Article 18. Participation in International Programs.

The students regularly enrolled in the PhD Course in Industrial and Information Engineering can optionally join other international programs promoted by the Doctoral Board. Adherence to an international program can extend the training requirements in arts. 10—15 of this GLs, as indicated in a specific Agreement governing this program.

Art. 19. Transition Rule

These GLs apply starting from XL (40°) cycle.