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Consiglio di Corso di Studio in Ingegneria Gestionale – Management Engineering Supplementary Regulations for the final examination of the Bachelor and Master of Science degree

These regulations are an integration of the Regulations for the BSc and MSc final examinations of the School of Industrial and Information Engineering approved by the Academic Senate on the 15th February 2021 and by the School Board on the 6th May 2021, and published at the following link: https://www.ingindinf.polimi.it/fileadmin/user_upload/scuola/esami_laurea/Regolamento_Esami_di_Laurea_e_Laurea_Magistrale_Scuola3i_maggio_2021.pdf

1. Final examination for the Bachelor (BSc)

The final examination for the Bachelor may consist in the presentation and discussion of a manuscript by the student (type A), or in the evaluation of specific activities carried out by the student during the Bachelor program (Type B).

1.1 FINAL EXAMINATION – TYPE A

Students must prepare a critical report on the project work they've carried out. More details on the editorial guidelines are given in Annex 1.

The manuscript must be delivered to the supervisor and to the teaching secretary office (thesis-dig@polimi.it for students enrolled at Milan campus, and segreteria-cremona@polimi.it for students enrolled at Cremona campus) by the deadline indicated by the secretary office.

In the days before the graduation session, the student presents the manuscript to a graduation subcommittee. The presentation must last a **maximum of 10 minutes**, followed by questions.

The evaluation of the type A final examination is done by the supervisor, who also considers the opinion of the company tutor, and by the subcommittee that attends the presentation. The evaluation is communicated to the graduation committee that operates on the date established by the School for the graduation exam.

1.1.1 Evaluation by the company tutor

At the end of the project work, the company tutor / mentor will fill in an evaluation form. The evaluation by the supervisor must take into account the evaluation made by the company tutor.

1.1.2 Evaluation by the supervisor

The supervisor, also based on the evaluation of the company tutor, will fill in an evaluation form in which he/she indicates a numerical score from -1 to 7 points, taking into account the commitment of the student, the autonomy in the management of the project work, the original contribution, the results obtained, and the quality of the manuscript.

1.1.3 Evaluation by the graduation subcommittee

The manuscript will be presented by the student to a graduation subcommittee, appointed by the Delegate for the final examinations, before the graduation session. The oral presentation usually takes place with the aid of a screen and video projector, and lasts for a maximum of 10 minutes, followed by questions.

The subcommittee, at the end of the presentation, defines for each student a score proposal for the final examination between -1 and 7 points, taking into consideration: the evaluation of the supervisor, the presentation, and the discussion. This score is subsequently communicated to the graduation committee which operates on the date established by the School for the graduation exam.

The subcommittee may also propose honors (i.e. cum laude), in compliance with the conditions described in the aforementioned Regulations for the BSc and MSc final examinations of the School of Industrial and Information Engineering. Specifically, the “cum laude” can be awarded only if the grade formulated is, before rounding to the nearest integer, greater than or equal to the number V defined as follows:

$$V = \max(113 - 0.5L, 111)$$

where L is the number of marks with “cum laude” obtained in the exams, with the exclusion of supernumerary exams.

1.2 FINAL EXAMINATION – TYPE B

For those students who include the Laboratory on Process Analysis and Modeling (Laboratorio di Analisi e Modellazione del Processi - LAMP) in their study plan, the degree score is determined on the basis of a project work developed during the Laboratory.

The evaluation obtained in the LAMP Laboratory is converted into a score between 0 and 7, according to the following relationship:

$$P = (E - 18) \times \frac{7}{12}$$

where:

P: score of the final examination.

E: mark taken in the course “Laboratorio di Analisi e Modellazione del Processi” (LAMP). The maximum value of E is equal to 30: the “cum laude”, if present, does not contribute to the evaluation of the score of the final examination.

Table 1 reports the scores associated with the various possible marks achieved in the Laboratory.

LAMP mark (out of 30)	18	19	20	21	22	23	24	25	26	27	28	29	30 e 30L
Score (out of 7)	0	0.58	1.17	1.75	2.33	2.92	3.50	4.08	4.67	5.25	5.83	6.42	7,00

Table 1

The score is subsequently communicated to the graduation committee which operates on the date established by the School for the graduation exam.

The graduation committee may also propose honors (i.e. cum laude), in compliance with the conditions described in the aforementioned Regulations for the BSc and MSc final examinations of the School of Industrial and Information Engineering. Specifically, the “cum laude” can be awarded only if the grade formulated is, before rounding to the nearest integer, greater than or equal to the number V defined as follows:

$$V = \max(113 - 0.5L, 111)$$

Where L is the number of marks with “cum laude” obtained in the exams, with the exclusion of supernumerary exams and the LAMP Laboratory.

2. Final examination for the Master of Science (MSc)

2.1 ORGANIZATION OF THE WORK

Each final project involves at least two types of actors:

- 1) the student, who is responsible for the content, the time management and all the activities necessary for the design and development of the thesis. The thesis can be written by one or two students;
- 2) the supervisor, i.e. a professor or assistant professor at Politecnico di Milano (see §5.1 of the Regulations for the BSc and MSc final examinations of the School of Industrial and Information Engineering) who guarantees that the work is relevant and coherent with the expected learning objectives of the MSc in Management Engineering. The supervisor evaluates the work consistently with the evaluation rubrics provided by the School of Industrial and Information Engineering.

Additional people that could be involved are:

- 3) the co-supervisor, i.e. a research assistant, a professor or any other person who supports the supervisor in supervising the thesis;
- 4) the reviewer, who is not involved in the supervision of the student's work and is selected to evaluate the thesis, when requested by the supervisor in line with the requirements of the School of Industrial and Information Engineering.

2.2 CHARACTERISTICS OF THE FINAL EXAMINATION

The final examination for the Master of Science consists in the presentation and discussion, by the student, of a thesis providing a theoretical, experimental and/or project-based contribution, developed in an original way under the guidance of a supervisor.

If the thesis is judged by the supervisor to be particularly deserving for its original contents and for the personal contribution of the student, a reviewer is also involved, and he/she formulates an opinion on the work to be submitted to the graduation committee.

2.2.1 Theses without reviewer

If the reviewer is not requested, the thesis can be assigned a score between -1 and 4 points, in line with the evaluation rubrics provided by the School of Industrial and Information Engineering.

In a thesis without reviewer, the executive summary is not mandatory. However, if present, it must be prepared according to the guidelines defined by the School of Industrial and Information Engineering (<https://www.ingindinf.polimi.it/en/teaching/lessons-and-exams/degree-and-master-degree-exams>).

The thesis without reviewer is assessed independently:

- by the supervisor, on the basis of the work carried out and the manuscript, consistently with the evaluation rubrics defined by the School of Industrial and Information Engineering;
- by the graduation committee, on the basis of the contents and the quality of the presentation.

The final score is obtained as a weighted average between the score proposed by the supervisor (50%) and the one proposed by the Committee (50%).

As defined by the Regulations for the BSc and MSc final examinations of the School of Industrial and Information Engineering, **it is not possible to assign the “cum laude” in the case of theses without reviewer.**

2.2.2 Theses with reviewer

A reviewer is defined if the thesis is judged by the supervisor to be particularly deserving for its original contents, in terms of developing new knowledge and / or innovative approaches (with reference to a topic of interest both to the scientific community and to companies / public administrations), and for the personal contribution of the student.

Please note that **the executive summary is mandatory in a thesis to be suitable for assigning a reviewer**, and it must be prepared according to the guidelines defined by the School of Industrial and Information Engineering (<https://www.ingindinf.polimi.it/it/teaching/lessons-and-exams/degree-and-master-degree-exams>).

The thesis with reviewer is assessed independently:

- by the supervisor, on the basis of the work carried out and the manuscript, consistently with the evaluation rubrics defined by the School of Industrial and Information Engineering;
- by the reviewer, on the basis of the manuscript, consistently with the evaluation rubrics defined by the School of Industrial and Information Engineering;
- by the graduation committee, on the basis of the content and the quality of the presentation.

If a reviewer is requested, the thesis can be assigned a score between -1 and 7 points. Furthermore, it can be assigned up to one additional point in the case of particularly brilliant presentations and excellent judgments by both the supervisor and the reviewer, and if all the members of the graduation committee agree.

The final score is obtained as a weighted average of the scores proposed by the supervisor (30%), the reviewer (20%) and the committee (50%).

Only in the case of a thesis with reviewer, the graduation committee may decide to award honors (“cum laude”), in cases where both the conditions set out in the Regulations for the BSc and MSc final examinations of the School of Industrial and Information Engineering are met, namely:

1. All the members of the graduation committee agree in the assignment of the “cum laude”;
2. $V > \max(113 - 0.5L, 111)$, where:
 - V is the final evaluation without rounding;
 - L is the number of exams in which the student obtained “cum laude”.

2.2.3 Structure of the Thesis

For illustrative purposes, Annex 2 reports some examples of works that can be presented as theses for the MSc Degree in Management Engineering, and Annex 3 contains some indications on the structure of the manuscript.

2.3 INSTRUCTIONS FOR THE ONLINE SUBMISSION OF THE THESIS

The instructions for the online submission of the thesis are available at the following link: https://www.biblio.polimi.it/fileadmin/user_upload/deposito_tesi/PoliTesi_Instructions_2020.pdf

2.4 CONTACTS

e-mail: tesi-dig@polimi.it

ANNEX 1: EDITORIAL INDICATIONS FOR THE MANUSCRIPT- BACHELOR

In the case of the Type A final examination, the student is required to prepare and submit a manuscript related to the project work. The manuscript must have a **maximum length of 30 pages** and must contain:

- a) Frontispiece (1 page): it must include the name and serial number of the student, and the names of the academic and company tutors;
- b) Executive Summary (max. 2 pages);
- c) Presentation of the company / organization where the project work was carried out (max. 4 pages);
- d) Initial objective of the project work;
- e) Activities carried out as part of the project work (in this section it is necessary to describe the activities carried out by the student, specifying the timing and the correlation between these activities and the models learned in the university career, possibly reporting appropriate bibliographic references);
- f) Original contribution of the student (in this section it is necessary to highlight the methodology applied by the student in approaching the project work, and how the project work was set up under the tutor's care);
- g) Objectives achieved (in this section it is necessary to highlight the results obtained, introducing appropriate performance indicators, and any critical issues encountered).

The breakdown into chapters may vary based on the specific content of the Project Work.

ANNEX 2: EXAMPLES OF THESES

A2.1 THESES WITHOUT REVIEWER

Theses without reviewer can be based on:

- **Empirical activities** conducted through interviews, surveys or other data collection methods (e.g. simulation models, experimental tools), or through an internship (for information on internship opportunities, please refer to the Career Service: <https://www.careerservice.polimi.it/en-US/Home/Index/>), and **contextualized in the state of the art of scientific literature**, which must highlight the student understanding of the topic.

To achieve the maximum score (4 points), a thesis without reviewer based on empirical activities must present:

- i. an analysis of the literature;
- ii. the results of the empirical activity;
- iii. a critical analysis of the results obtained, with a discussion of the implications for the scientific community and for practitioners.

Thesis works that present the results of the empirical activity, without contextualization in the scientific literature and with a very limited discussion of the results, can aim to obtain a maximum of 2 points, consistently with the evaluation rubrics defined by the School of Industrial and Information Engineering.

The length of the manuscript in the case of a thesis based on empirical activities can vary significantly depending on the specific context, but in general it is **between 50 and 150 pages** (excluding bibliography and any attachments). In any case, **the maximum length allowed is 200 pages** (excluding bibliography and any attachments).

- **Systematic literature review**, in which students analyze the literature on a specific and consolidated topic, providing a synthesis of what has been studied so far, identifying the topics currently under investigation and defining possible future lines of research.

To achieve the maximum score (4 points), a thesis without reviewer based on a systematic literature review must include:

- i. the adoption of structured methodologies, e.g. systematic approach with the use of content analysis;
- ii. the proposal of innovative interpretations;
- iii. the definition of a research agenda to fill the gaps in the literature that have been identified in the analysis.

Theses that summarize only the state of the art of literature can typically aim for a maximum of 2 points, consistently with the evaluation rubrics defined by the School of Industrial and Information Engineering.

The length of the manuscript in the case of a thesis based on literature analysis can vary significantly depending on the specific context, but in general it is **between 50 and 150 pages** (excluding bibliography and any attachments). In any case, **the maximum length allowed is 200 pages** (excluding bibliography and any attachments).

- **In-depth case study**. Students must identify a case study (e.g. based on a short internship), identify a specific problem and formulate a solution by applying models and / or methodologies consistent with the topics of the MSc in Management Engineering.

To achieve the maximum score (4 points), a thesis without reviewer based on a case study must include:

- i. the description of the case and the problem to be solved (about 15/20 pages);
- ii. Digital and multimedia material to support the case (when applicable);

- iii. Notes that describe in detail the methodologies adopted and the solution of the problem (about 25/30 pages).

In a thesis without reviewer the executive summary is not mandatory. However, since this document is useful to summarize the results of the work, and it is also useful in view of the preparation of the presentation, **it is recommended** to be included in all the theses. In this regard, please refer to the guidelines defined by the School of Industrial and Information Engineering (<https://www.ingindinf.polimi.it/it/didattica/lezioni-e-esami/esami-di-laurea-e-laurea-magistrale>).

Theses without reviewer are presented on the graduation day in the presence of the committee with a **10-minute presentation**, followed by questions.

A2.2 Theses with reviewer

A thesis with reviewer is characterized by the development of new knowledge and / or innovative approaches with reference to a topic of interest both to the scientific community and to practitioners and / or policy makers. The work must present a discussion of the results obtained aimed at highlighting the theoretical and practical / managerial implications. The originality of a thesis with reviewer is related to:

- i. the critical analysis of the scientific literature;
- ii. formulating research questions, hypotheses and analysis frameworks;
- iii. new models and empirical evidence;
- iv. discussion of the empirical results and the implications of the results obtained.

The length of the manuscript in the case of a thesis with reviewer can vary significantly depending on the specific context, but in general it is **between 100 and 150 pages** (excluding bibliography and any attachments). In any case, **the maximum length allowed is 200 pages** (excluding bibliography and any attachments).

The theses with reviewer are presented on the graduation day in the presence of the committee with a **15-minute presentation**, followed by questions.

ANNEX 3: EDITORIAL INDICATIONS FOR THE MANUSCRIPT- MASTER OF SCIENCE

The thesis must be written in a way that it can be read and understood ideally by anyone with a managerial background, and the reader should be able to find all and only the relevant information to understand the effort required and what the students have developed.

The quality of the manuscript, as also indicated in the evaluation rubrics of the School of Industrial and Information Engineering, is an important aspect of the evaluation, and must be carefully treated.

As regards the layout of the manuscript, refer to the "Classic format" provided by the School of Industrial and Information Engineering (<https://www.ingindinf.polimi.it/it/didattica/lezioni-e-esami/degree-and-master-degree-exams>).

In a thesis with reviewer, from a conceptual point of view at least seven parts can usually be identified (for theses without reviewer some of them may be absent):

1. **Abstract** (about half a page, on average);
2. **Executive summary**: a summary of the work (4-6 pages), to be written according to the format provided by the School of Industrial and Information Engineering (<https://www.ingindinf.polimi.it/it/didattica/lezioni-and-exams/degree-and-master-degree-exams>);
3. **Introduction**: it is the first part of the main body of the manuscript, and is intended to illustrate the topic of the work and its relevance / originality;
4. **Literature review**: in this part an analysis, comparison and systematization of the state of the art of knowledge on the topic is presented;
5. **Research objectives, methodologies and frameworks**: this section presents in detail the gaps in the literature, the research questions and the methodologies that are used. If present, the theoretical / conceptual framework that will be tested in the empirical analysis is also detailed;
6. **Results**: presentation of the evidences emerging from the study. In this section the results are presented only, without being discussed;
7. **Discussion**: this part includes:
 - the comment on the results obtained;
 - the answer to research questions, with particular attention to the discussion of how the results obtained confirm (or not) current knowledge on the topic, or how they add new relevant knowledge;
 - the implications of the study in terms of contribution to theory and guidelines / suggestions for practitioners;
 - the limitations of the study, highlighting the domain in which the results provided can be considered reliable in the light of the hypotheses underlying the research and the choices on methodology. The limits should suggest possible future developments of the work;
 - the conclusions, i.e. a summary (2-3 pages) of the original elements of the thesis.

Thesis works must include the Bibliography. There are several options for citing bibliographic sources. Please refer to the "Classic Format" of the thesis manuscript provided by the School of Industrial and Information Engineering for further details.

It is also possible to attend courses that are periodically organized by the University on "Bibliographic citations and bibliography management". For more information: <https://www.biblio.polimi.it/strumenti/corsi-e-tutorial>