

Annex No. 1 to Dean's Order No. 13/2021

THESIS STANDARDS FOR DEGREE PROGRAMMES COVERING THE LEARNING OUTCOMES FOR ENGINEERING COMPETENCE

for theses prepared at the Faculty of Finance and Management at
the Wrocław School of Banking

1. General requirements

1.1. The diploma thesis - an engineering thesis should be a study of a specific practical problem or a technical achievement presenting the student's knowledge and skills related to a given field of study, first degree level (PRK level VI) and the practical profile of education the leading discipline to which the field of study has been assigned.

1.2. The topic and research area of the diploma thesis - engineering should be related to the learning outcomes adopted for the field of study. The thesis shall be conducted under the direction of a supervisor who shall will ensure their achievement.

1.3. The essential aim of the thesis - engineering prepared independently by the student is:

- Demonstrate the ability to formulate and solve problems relating to the programme of engineering, technical and technological studies undertaken, using general and specialist knowledge
- Demonstrate knowledge and skills in the use of contemporary engineering action tools, including computer techniques, and the editorial preparation of a paper based on the skills acquired during the studies.

1.4. The engineering thesis should result in the design or conception of a broadly understood IT system, including, but not limited to, an IT system, a computer network, a telecommunications network, as well as the commissioned and tested implementation of the system or a part thereof or computer simulation of its operation.

The student, as the author, bears full responsibility for the originality and accuracy of the material presented. In the process of preparing the thesis, the student should take into account all laws and good customs in this area.

2. Content requirements

2.1. The work should include:

- defining the purpose of the work and its scope ;

- problem statement based on an overview of current solutions and technical/technological standards, - technical solution concept and design
- use of appropriate analytical tools, measurement techniques, measurement equipment used in the work, computer simulation tools
- to draw conclusions on the basis of the analysis carried out.

An engineering paper may define a research problem.

2.2. The structure of the work should lead to the achievement of its objective.

2.3. The preparation of the thesis - engineering should shape in the student the skills:

- extending knowledge through independent study of the literature on the subject;
- the selection and linking of subject literature to the engineering problem being solved;
- diagnosis and assessment of the problem in the business or institution under review;
- designing new solutions or modifying existing ones;
- identify and analyse surrounding phenomena, especially those which the graduate will have to deal with in practice;
- recognising regularities within these phenomena;
- evaluating and drawing conclusions;
- actively use the knowledge acquired during their studies and apply it to practice or theoretical inference;
- follow a logical flow of argument and use clear and precise language.

2.4. The dissertation should have a distinct theoretical part (analysis of the literature on the subject) and a project part (results of own observations and/or research directed towards a practical solution of the problem analysed).

2.5. Theory should concisely present advanced knowledge (PRK level VI) of the selected topic resulting from a review of national and international literature, standards, recommendations of standardization organizations, industry web portals

3. Requirements concerning the nature of the work

The thesis - engineering can be:

- research** - the author identifies relationships between economic phenomena and detects dependencies, within the studied slice of economic reality. The paper may also be experimental - *in which case* it contains the experimental solution of a specific research hypothesis and includes the conception and appropriate selection of research methods, planning and organisation of the experiment, presentation of the obtained results, their discussion and conclusions;
- project (application)** - is a concept or design of a given system (e.g. a technological process, product manufacturing, management, including computer, logistics, organisational), performing specific utility functions resulting from the analysis of the environment or user needs, with or without implementation.

4. Regulatory requirements

Thesis - Engineering:

- is the student's independent work prepared under the guidance of the supervisor,
- subject to review,
- subject to verification in the Single Anti-Plagiarism System
- is subject to defence during the diploma examination,
- enables the graduate to obtain a professional engineering degree.

5. Formal requirements

Layout of the work - the work contains, in addition to chapters:

- a) title page;
- b) title and summary;
- c) table of contents;
- d) introduction and conclusion;
- e) clips;
- f) annexes;
- g) statement (a sample statement is provided on the Extranet). Student statements should be placed at the end of the thesis.

Layout of the work implemented in English - the work includes, in addition to chapters:

- a) title page;
- b) the title of the work and an abstract in Polish;
- c) table of contents in english;
- d) introduction and conclusion;
- e) clips;
- f) annexes;
- g) a statement (a model statement can be found on the Extranet). Student statements should be included at the end of the thesis.

The work should include lists in order:

- a) list of references in alphabetical order in accordance with the requirements of the bibliographical description;
- b) list of legislation and other regulations used;
- c) a list of material from online sources (with the latest date of access) and other reference material with full bibliographical annotation;
- d) index of tables;
- e) list of figures (diagrams, maps, charts, etc.);
- f) annexes.

The introduction should outline the general background of the issue/engineering problem under consideration, indicate the rationale for choosing the topic of the thesis, formulate the research problem, define the purpose and scope of the thesis, indicate the research methods and measurement techniques, equip the measurement tools used in the thesis, and provide general information on the content of the individual chapters of the thesis.

In the conclusion, synthetic conclusions resulting from the work should be indicated.

Literature footnotes should be uniform according to one of the styles:

- a) Harvard style;
- b) APA style http://www.wydawnictwo.ue.wroc.pl/dla_autorow/14627/literatura.html;
- c) bibliographic style of footnotes);

The literature should comprise at least a dozen items in the form of compact works and articles. In addition, it may be supplemented with legal acts and a list of websites, if required by the topic of the work. The literature should preferably include foreign language references. The list of source materials may include only the items referred to in the paper.

The thesis should be no less than 60 pages long and discuss the topic in detail. The volume of the thesis is ultimately decided by the thesis supervisor - taking into account the nature of the thesis and additional documentation.

6. Content of the work

The work should have a clearly defined **problem, objective and method of its implementation**, should be characterised by conciseness and logical arrangement, and should have a proper proportion between the individual parts (chapters) of the work. Therefore, e.g. the chapter describing the current state of knowledge should not be disproportionately longer than e.g. the chapter describing implementation. In the case of works of a design and implementation nature, the literature review highlighting the current state of knowledge should be replaced with a description/characterisation of the tools used to implement the project.

The title of the thesis/chapter, must be relevant to the content of the thesis or chapter. The title of the thesis as well as the chapter titles should be problem-based.

The content of the work is divided into chapters and subchapters, and their layout must be based on the principle of result. Each chapter should start on a new page.

Activities that lead to an artificial increase in it are 'suspect'. The content of the work is important. Therefore, the spacing between letters in words or between words in sentences should not be manipulated.

The introduction should include a thorough discussion of the context of the work, the problem the work addresses, the state of the art with reference to the literature, the flaws, the inadequacies of current solutions, the new quality that would need to be created in the proposed engineering design work.

It also includes the motivations that led the Author to address the problem. This information is intended to justify the advisability of taking up the given topic of the work, to point out the benefits of the proposed solutions aimed at improving the process and to interest the reader.

The introduction should include the following elements: a brief justification for taking up the topic; the purpose of the work, the scope (subject, subject, time) explaining the extent to which the work will be carried out; any theses/hypotheses that the author intends to test or prove; a brief description of the sources, especially literature; the layout of the work, i.e. a brief description of the content of the individual chapters; any comments on the implementation of the work topic, e.g. difficulties that arose during the implementation of the individual tasks, possibly comments on the equipment used and information on cooperation with the companies studied.

The theoretical part, from the selected topic of the implemented field of study; should be based on a review of literature and production/service practice highlighting the state of knowledge on a given topic - i.e. include chapters written on the basis of the literature, a list of which is provided in the *Inventory of source materials* section. The text of the thesis must contain references to all items included in the literature list. References to the literature should be placed in the footer of the page. The author of a diploma - engineering thesis is absolutely obliged to indicate the sources of information presented in the thesis; this also applies to figures, tables, excerpts from the source code of programmes, etc. The author of a diploma - engineering thesis is obliged to indicate the sources of information presented in the thesis. Web site addresses with the date of access in the case of sources from the Internet should also be provided.

Practical part, describing the current situation, e.g. in the company under investigation, with regard to existing solutions which the Author wishes to improve/optimize or to propose new solutions. The practical part describes in detail the proposals for solving the problem announced in the Introduction. It focuses on the realisation of the main objective of the work - containing a description of the concept and the adopted research methodology and method (with a clear emphasis on the objective of the work) and a presentation of the analyses (presentation of results).

The thesis must contain elements of the Author's own work, relevant to his/her practical knowledge gained during the study period. The Author's own work may be considered, for example:

1. improving a selected process (e.g. production planning)
 - production planning
2. presenting a proposal for a new solution that will enable, for example
 - reduction of production/service area;
 - reduced expenditure on machinery/equipment,
 - will increase manufacturing efficiency/reduce stock outs, slope,
 - will reduce the number of faults,
 - a reduction in machine and plant changeover times,
 - a higher level of customer service.

Pointing clearly to the effects of, for example:

- economic efficiency (productivity, reduction of inventory costs, increase in added value ratio, re-education of working capital, increase in sales, increase in material turnover ratio, re-education of storage value)
- technical efficiency (reduction of warehouse space, reduction of stocks, re-education of employment, re-education of distances between workstations, reduction of part flow paths, reduction of production area, reduction of production cycle length, reduction of preparation and completion times, re-education of downtime, reduction of workload time, reduction of order completion time, re-education of new product design cycle, reduction of unit time, reduction of equipment failure rate, machine failure rate, increase in number of orders completed on time, increase in work safety)
- quality efficiency (reduction of production shortages, reduction of the number of defective finished products, reduction of rejected deliveries)

In IT work, the author's own work may be considered to be the creation of an IT application or a fragment thereof, proposing an algorithm to solve a detailed problem, proposing improvements to a system supporting production management, etc.

The author should ensure that the own work is properly documented, including the specification of assumptions and how the individual tasks were carried out, together with their evaluation and a description of any problems encountered. In the case of work of a design and implementation nature, this part of the work is replaced by technical and user documentation of the system.

In the case of papers in the IT Project Management (ZPI) specialisation, the entire source code of the developed programmes should not be included in the thesis. The source code of the written programmes, any software produced and used in the thesis, and the results of the experiments carried out should be placed on a CD in addition to the thesis.

The conclusion of the work should include the Author's response to the tasks indicated in the Introduction, in particular the aim, measures and scope of the work, and a comparison with the actual results of the work. Such an approach enables a clear statement of the extent to which the stated objectives have been achieved and highlights the results achieved by the Author as part of his or her independent work. This part of the work should also include a discussion of the difficulties encountered in carrying out the work and the advantages and disadvantages of the solution adopted.