Engineer's Thesis - Architecture

Methodological Guide fot Thesis Student*

SUMMARY

A methodological guide discussing the fundamental issues related to preparing an engineering diploma thesis, from selecting a thesis supervisor to the diploma defense at the Faculty of Architecture of Poznań University of Technology.

AUTHORS

Prof. dr hab. inż. arch. Piotr Marciniak
Dr hab. inż. arch. Agata Gawlak, prof. PP
Dr inż. arch. Barbara Świt-Jankowska

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* Prepared on the basis of: the Act 2.0 (Law on Higher Education and Science of July 18, 2018, published in the Journal of Laws, item 1668, of August 30, 2018) and the Regulation of the Minister of Science and Higher Education of July 18, 2019, on the standards of education preparing for the profession of architect (item 1359), as well as based on the Regulations of Studies of Poznań University of Technology and the first-cycle study program in Architecture.

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1. Purpose of the thesis

The engineering diploma thesis is a summary of the entire undergraduate education cycle. The engineering diploma thesis is a project-based work in which the student presents architectural, structural, and other industry-specific solutions appropriate to the knowledge and learning outcomes acquired throughout the undergraduate education cycle.

The diploma thesis confirms the achieved learning outcomes, in accordance with the educational standard preparing for the architectural profession[1]:

In terms of knowledge, the graduate knows and understands:

E.W1. issues related to architecture and urban planning in solving design problems;

E.W2. issues related to architecture and urban planning useful for designing architectural structures and urban complexes in the context of social, cultural, natural, historical, economic, legal, and other non-technical conditions of engineering activities, integrating the knowledge acquired during the studies;

E.W3. principles, solutions, structures, and building materials used in the performance of engineering tasks in the field of architectural and urban design;

E.W4. Issues related to architecture and urban planning in the context of the multidisciplinary nature of architectural and urban design and the need for collaboration with other specialists; E.W5. Principles of professional presentation of architectural and urban concepts.

In terms of skills, graduates are able to:

E.U1. Analyze existing conditions, evaluate the state of land development and buildings, and formulate design conclusions;

E.U2. Design an architectural structure or urban complex, creating and transforming space to give it new values – in accordance with the adopted program, taking into account non-technical aspects and integrating interdisciplinary knowledge and skills acquired during their studies;

E.U3. Prepare advanced graphic, written, and oral presentations of their own design concepts in the field of architecture and urban planning, meeting the requirements of Journal of Laws – 14 – Item 1359 – 13 – professional notation appropriate for architectural and urban design.

In terms of social competences, graduates are ready to:

E.S1. Effectively use imagination, intuition, a creative attitude, and independent thinking and creative work to solve design problems;

E.S2. Accept criticism of the solutions presented and respond to it clearly and objectively;

E.S3. Use information technology to integrate with other participants in processes and projects, including project presentations and communicating feedback in a generally understandable manner.

It is important to remember that the diploma should confirm that the student has mastered practical professional skills – design and workshop (note: an engineering diploma project is not strictly a construction project; it is a detailed conceptual design with technical elements supplemented by a written section describing the project).

A detailed description of the diploma process is included in the document: Procedure – Diploma Process.

[1] REGULATION OF THE MINISTER OF SCIENCE AND HIGHER EDUCATION1) of July 18, 2019, regarding the standard of education preparing for the profession of architect.

2. Activities preceding thesis work

2.1. Selecting a thesis supervisor

At the final meeting preceding the selection of a thesis supervisor, the Vice-Dean presents the Faculty Council with a list of supervisors for approval, in accordance with the Regulations in force at the Faculty of Architecture, Poznań University of Technology. The supervisor is selected no later than one month before the end of the semester preceding the diploma semester.

The supervisor is selected in a dedicated course on the ekursy.put.poznan.pl platform, according to the schedule posted on the website:

- The student uploads their portfolio to the assignment module and selects a supervisor from the list of available supervisors.
- The supervisor approves or rejects the student.
- A student whose selection is not approved by a given supervisor has the right to participate in the next selection round.

The supervisor selection schedule includes three selection rounds. Supervisors whose quota of places has been reached are not available in the next round. After the specified period ends, the student who is not accepted is randomly assigned to an available supervisor.

2.2 Choosing a Thesis Topic

The list of topics is updated annually by the Faculty Committee for the Quality of Education and approved by the Faculty of Architecture Council by open vote. Each academic teacher has the right to submit a proposed thesis topic to the Faculty Committee for the Quality of Education. Proposals are reviewed for content and form – and then, after receiving a positive opinion from the Committee, forwarded to the Faculty Council for approval. When evaluating the proposed topics, the Committee considers their compliance with the learning outcomes defined in the curriculum, current standards for architectural education, as well as the educational and design value of the topics in the context of developing students' professional competencies.

Materials for the engineering diploma (basic map, zoning decision/local plan, functional program) are made available to graduates on the ekursy.put.poznan.pl platform.

The thesis topic should be selected before the beginning of the diploma semester. The topic is submitted via the APD system, which manages the diploma process and the archiving of diploma theses (APD), and operates within the USOS environment. Within the APD system, the thesis supervisor and the interested student submit a proposed diploma topic (no later than the end of the semester preceding the diploma semester). This is then reviewed and approved by a three-person committee consisting of the Vice-Dean for Education, the Institute Director (who, depending on the thesis supervisor's place of employment, is responsible for verifying the substantive accuracy of the submitted topic), and the Institute Secretary's Office (verifying data accuracy). Topics must be submitted via the APD system no later than the beginning of the diploma semester.

The application must include the thesis title (PL and EN) and a description of the planned project activities, a list of starting materials, and the scope of the diploma thesis (written section, graphic section, layout).

For engineering diplomas, it is not possible to develop your own topics.

3. Scope of the Diploma Thesis

The diploma thesis consists of two parts: a graphic section in the form of boards and a written section in the form of a coherent study.

Both parts are mandatory and constitute the entire diploma thesis. The graduate prepares a written thesis and a graphic section in digital format. Additionally, the boards should be printed on rigid board and delivered to the Faculty of Architecture at the Faculty of Architecture on a designated date (the date and location are determined in each case in the diploma semester schedule). All boards are presented as part of a joint review of the diploma theses, attended by the entire faculty of the Faculty of Architecture. This review serves both as a tool for objective evaluation and as a stage for recommending the best works for competitions and exhibitions.

The graduate also creates a model of the designed facility, along with its immediate context, and brings it to the Faculty on the day of the defence.

The graduate uploads photos of the model, along with the thesis, to the USOS APD system.

3.1. Written part

The written section should be approximately 50 pages in A4 format, vertically oriented. The number of pages may be increased in justified cases and after consultation with the thesis supervisor. The graduate student is not required to print the thesis. The engineering thesis should be uploaded to the USOS APD system (in PDF format) within the deadline specified in the Poznań University of Technology's Study Regulations. After submitting the thesis, it is automatically transferred to the Unified Anti-plagiarism System (JSA). After receiving the results of the anti-plagiarism analysis and verifying the completeness of the uploaded files by the graduate student, the supervisor accepts the thesis in the system, which formally constitutes its submission. After the deadline for submission, the Vice-Dean for Education establishes a defense schedule in accordance with the rules specified in the Study Regulations. The supervisor and reviewer enter their reviews and ratings into the USOS APD system; once approved, the student has the opportunity to review their content.

List of essential elements of written work:

- Title page according to the template (template: appendix no. 1),
- Table of contents,
- **Abstract** of the thesis in Polish and English,
- **Introduction** (containing the introduction, purpose and subject of the thesis, its scope, and any assumptions made),
- **Analytical section** of the thesis (including analysis of sunlight, building height, function, greenery, communication, composition and character of existing buildings, etc.). A graphical solution to the analytical part is permitted (on the first board presented); their placement is not mandatory and is left to the student's discretion.
- **Project description** – main assumptions, including a description of the basic aesthetic, compositional, and functional solutions, including a land development plan (graphic and written parts) with a clear legend and a surface balance sheet containing (among other things) the plot/area area, built-up area, % of built-up area, net intensity, total area, net area, usable area, volume, number and type of apartments (in the case of a residential building), number of parking spaces (including on-site and underground parking) at a scale of 1:500. The descriptive part should also explain the building's accessibility for people with disabilities (universal design) and indicate the climate-friendly solutions used.
  Technical description of the project, i.e., a description of the technical solutions adopted in the project; it should include the most important material and technological solutions for individual building elements, fire protection principles; and should also discuss the basic structural and installation solutions. Material and technological solutions, balance sheets, fire protection principles, and solutions for structures, installations, roads, infrastructure, energy savings, etc.
- **Summary**

- List of illustrations (with sources cited)
- List of tables (if present)
- References (template appendix no. 2)
- Thumbnails of boards, i.e. boards reduced to A4 format
- Other: the study may include annexes in the form of separate studies, sketches, and other elements influencing the presentation of the thesis's results.

Text editing should adhere to accepted standards for theses in terms of font selection and size (max. 12) and line spacing (1.15 or 1.5). Chapters and subchapters should be graphically separated.

The thesis should demonstrate the ability to use bibliographic footnotes. All citations and photographs should be described and the source cited..

3.2. Graphic part

The graphic portion of the thesis should be presented on 4-6 vertically arranged 100x70 boards. The boards should be stiffened to facilitate presentation (e.g., printed on foam). The number of boards may be increased with the thesis supervisor's approval.

The boards should contain:

- site development plan (graphic section with legend and site plan, all markings, and the content of the PZT should comply with applicable law), scale 1:500
- floor plans of all above-ground and underground floors, along with a list of rooms and a roof plan, scale 1:100
- at least two cross-sections, taken in characteristic locations (vertical circulation), scale 1:100
- designed elevations (if required by the project topic, elevations should be compared with existing buildings)
- axonometric drawings (minimum one, maximum three) spatially illustrating the building or building complex
- technical board - fragments of the plan and cross-section, dimensioned and described in detail (scale 1:50)
- architectural or urban detail, including technical solutions (scale 1:20, 1:10, 1:5). The detail should address a specific feature of the designed building – do not exaggerate construction details found in literature or online.
- Visualizations of the project, showing its scale, the context of the existing development, the designed materials, and the building's color scheme.
- Necessary descriptions and textual information

Additionally, the boards may include elements presented in the written section, such as analyses, diagrams, etc. Each board should be marked with a sequential number, clearly indicating the board's layout and composition. The graphic layout of all boards should be legible, consistent, and consistent with the principles of proper graphic composition.

Each board must include:

- title of the work
- author's name and surname
- academic title, name and surname of the supervisor
- name of the faculty and university
- date of completion.

3.3. Model

The graduate student and the thesis supervisor discuss the scale of the model, its level of detail, and the technique used.

The graduate student uploads enough views to the system to show all sides of the designed object, including at least one view from above. The graduate student delivers the actual model to the Faculty on the day of the defense.

The model should be handcrafted by the graduate student; models created by professional firms are not permitted. It should be a working model – a scope that allows for the assessment of the adopted formal and compositional solutions within the immediate context of the study area.

4. Activities to complete your diploma work

4.1. Submitting a diploma thesis – USOS APD system

Once the thesis topic submission is approved by the relevant committee, the proposals are transferred to the Dean's Office module, where the thesis is created. This is the first step in preparing for the diploma examination. From this point on, the thesis topic cannot be changed.

When the supervisor determines that the student's thesis is ready for the diploma examination, they submit a thesis form to the APD (Application for Documentation) for the student to enter data and files. The student completes the abstract and keywords in Polish and English.

After saving the entered data, the student declares that they wrote the thesis independently through the approval process.

The thesis is submitted electronically. The thesis submission deadline is the date the thesis is approved by the Supervisor. If the thesis is uploaded on time and the thesis is approved by the Supervisor later, the thesis must submit a request to the Dean's Office for an extension of the thesis submission deadline, along with an explanation.

Uniform Anti-plagiarism System – JSA

After submitting the thesis, it is automatically transferred to the Unified Anti-plagiarism System (JSA). The waiting time for the results of the plagiarism check is approximately 12-48 hours, depending on server activity. **The candidate should take into account the time needed for the thesis review, analysis, and approval of the results, and upload the thesis well in advance of the statutory submission deadline**. After completing the review, the Supervisor informs the candidate of the result. If the thesis' similarity is greater than 60%, the Supervisor is required to provide a written justification for approving the thesis for defence. The candidate has the right to replace the files twice, provided the thesis has not been accepted by the Supervisor in the system. In each case, the thesis is re-checked by the JSA. (The candidate should take into account the system's uptime – therefore, a safe time for uploading the finished thesis is approximately 3-4 days before the submission deadline). The graduate uploads graphic attachments to the system:

- thesis boards - vertical format 100x70, each board in a separate file, resolution: 300 dpi, file size: up to 20 MB,
- photos of the mock-up or virtual model visualizations - the mock-up should include the immediate surroundings of the building or complex of buildings and fully convey information regarding the formal solutions used in the design. In the case of virtual model visualizations, they should show the entire project, including the materials and color schemes used. At least one view should be from a bird's-eye view. The number of photos/visualizations is unlimited, depending on the scale of the project - as a rule, all information regarding the external appearance of the designed building or complex should be provided.
- a declaration of consent to participate in competitions.

The supervisor receives an email informing them of the pending anti-plagiarism results in the APD system. Before approving the thesis, the supervisor should ensure that the final version of the thesis is available in the system, verify that all graphic attachments have been uploaded, and that the uploaded files are complete and open correctly.

The absence of graphic attachments prevents the thesis defence.

The date of acceptance of the JSA examination result is considered the date of the thesis submission, in accordance with the Study Regulations. The candidate should take into account the time needed for the thesis review, analysis, and acceptance of the examination results, and upload the thesis well in advance of the statutory thesis submission deadline. A safe deadline is approximately 48 hours.

After the submission deadline and the thesis supervisor's approval, the Vice-Dean establishes a defence schedule (day, time, and committee composition) in accordance with the principles set forth in the Study Regulations. The supervisor and reviewer enter their reviews and ratings into the USOS APD system; once approved, the student has the opportunity to review their content. The CSS publishes information about the composition of the

examination committee, date, location, and format of the diploma examination in the USOS system no later than two business days before the scheduled examination. In unforeseen circumstances, the composition of the examination committee, time, location, and format may change on the day of the defence.

The graduate must also submit the diploma application electronically via the USOS WEB system, and in person to the CSS, additional information for the supplement in Polish (if any), along with attachments confirming the aforementioned information and additional information for the supplement in English (if any).

4.2. Criteria for evaluating a diploma thesis

The thesis is evaluated by the thesis supervisor and a reviewer appointed by the Vice-Dean for Student Affairs. The thesis supervisor confirms the positive evaluation of the thesis by approving it in the system. Before approving the thesis, the supervisor should verify its completeness.

A positive review by the reviewer is a prerequisite for admission to the thesis defence. In the event of a **negative** review, the Vice-Dean will appoint an additional reviewer.

- If the second reviewer's opinion is positive, the diploma examination will take place as scheduled.
- If the second reviewer's opinion is negative, the diploma examination will not take place. The graduate will be removed from the student register. The graduate may resume studies in the final semester.

When evaluating a diploma thesis, the supervisor and reviewer take into account the following criteria:

A. Analysis and assessment of the existing condition, correct formulation of design conclusions.
B. Application of regulations arising from the Building Law and relevant regulations and standards, including in the land development plan. Assessment of the degree of accessibility (universal design).
C. Assessment of the adopted formal solutions, including their connection with the built and unbuilt environment (spatial order, development context).
D. Assessment of the applied functional solutions, in accordance with the adopted utility program.
E. Assessment of the applied solutions in terms of structures, installations, and building materials, in the context of the multi-discipline nature of architectural design.
F. Assessment of the applied solutions that take into account the requirements of sustainable development and climate protection (water, renewable energy), greenery design and biologically active surfaces, and the impact of the investment on society.
G. Written work: clarity of the description, ability to logically present the design process, use of footnotes, appropriate selection of sources, correct bibliographic description, selection of illustrative material. Scope consistent with the guidelines.
H. Graphical Presentation/Boards - Application of the principles of professional presentation of architectural and urban planning concepts, legibility, and composition of design boards.
I. Substantive Quality of Technical Drawings, Architectural Detail - Application of the principles and standards applicable to the creation of technical drawings: dimensions, graphic symbols, descriptions.
J. MODEL - Degree of representation of the adopted formal solutions in relation to the existing context – built and unbuilt surroundings.

4.3. Thesis Defence

The **defence** of an engineer's thesis consists of two parts: a project presentation (this part is open to the public and may also include invited guests) and a final exam (this part is closed to the public).

Project Presentation

On behalf of the Dean of the Faculty of Architecture, PUT, the Chair of the Committee opens the public portion of the engineer's thesis defence.

The project presentation is oral and lasts approximately 10-15 minutes. The main assumptions of the thesis, the research section, and the method for solving the selected research problem should be presented, along with a discussion of the structure of the proposed building (context, land use, form, function, technical solutions). The student may use a previously prepared graphic presentation or design boards during the thesis discussion. The

presentation may not include design elements (visualizations, technical drawings, etc.) that were created after the thesis was submitted.

After the student presents the project, the Chair of the Committee gives the floor to the thesis reviewer. The reviewer reads the prepared review of the thesis. The Chair then asks the student to verbally address the reviewer's comments and concerns.

After the student has responded, the Chair opens the discussion on the thesis. Everyone present in the room is welcome to participate. After the discussion, the Chair closes the open portion of the thesis defence and asks all guests to leave

Examination Part

The thesis committee asks the student three questions based on the applicable exam topics. (The Faculty Council approves the list of applicable thesis topics no later than before the start of the thesis semester. The list is published on the website.)

A passing score in this part of the exam depends on obtaining positive grades on at least two questions. In justified cases (two negative grades, one positive), the committee may ask the student two more questions. The number of positive grades should exceed the number of negative grades. After all questions have been answered, the Chair asks the student to leave the room and opens a discussion among the Committee members on the thesis submitted for defence.

After determining the grades, the Chair asks the student to return to the room and presents the defence results. During the defence, the student receives the following grades, which contribute to the final result of the studies:

- a grade for the thesis presentation (the grade depends on the presentation style, clarity of the message, the student's behaviour during the presentation, and when responding to the reviewer's questions)
- a grade for the thesis (according to the evaluation criteria, section 4.2)
- separate grades for each exam question (the grade relates to the student's knowledge)

The final result of the studies is determined by the diploma examination committee, calculated to two decimal places based on the sum of:

- 0.6 of the weighted average grades from the course of studies;
- 0.2 of the thesis grade;
- 0.2 of the diploma examination grade

A student who receives a 5.0 grade for their thesis is required to leave the boards at the Faculty. The boards are kept in the Faculty's archives for one year from the **defence** date. After this time, the student may retrieve the boards. To do so, they must submit a request for the boards to the Dean's Office **(CSS)**.

4.4. Competitions

Diploma theses can be submitted individually or through the Faculty Authorities to diploma thesis competitions, in accordance with separate regulations and competition rules. Notices about current competitions are regularly posted on the Faculty website and Facebook page. The Faculty (CSS) must be informed of participation in the competition within six months of the defence date.

5. List of Appendices

1. Title page template
2. Bibliography – rules for creating