



RULES

FOR THE FORMATION OF THESIS ASSIGNMENTS, DIPLOMA THESES AND CONDUCTING GRADUATE DEFENSES FOR THE SPECIALTIES IN THE FACULTY OF ELECTRONICS AND AUTOMATION

GENERAL

- 1. These guidelines have been prepared in order to increase the quality of the organization and training of graduates in the Faculty of Electronics and Automation.*
- 2. The guidelines have been developed on the basis of the Regulations for the organization and operation of TU-Sofia, as well as the national law on higher education and are mandatory for all departments in FEA. The departments prepare the necessary information for familiarizing their graduates with the organization and realization of the thesis defenses conducted by it. This information is published in a specially created course in FEA Moodle.*

I. OBJECTIVE OF THE THESIS

The aim of the thesis is to further develop the necessary skills of the students to independently solve tasks of a complex nature, such as those they will have to solve in their future work as engineers in their field and with the relevant qualification characteristics, as well as to expand knowledge and experience in a certain area.

Through the thesis and its defense, the knowledge and skills acquired during the course of study are evaluated, including fundamental knowledge and terminology in the relevant field and skills to implement engineering solutions.

II. CHOOSING THE TOPIC, DETERMINING THE THESIS SUPERVISOR, PREPARING AND RECEIVING THE ASSIGNMENT

1. Within one week after successfully passing the final exam of the tuition course, the student is required to register at the faculty office of FEA, by which the student receives official graduate applicant status according to article 102 of the regulations book. After receiving a thesis assignment, approved according to the relevant order, the student receives the status of a graduate candidate of the relevant department.
2. The heads of the departments organize the collection of proposed areas and topics for thesis projects from the teachers and doctoral students of the departments in accordance with the parameters



for thesis development laid down in the curriculum for each specialty and degree level. After acceptance by the department council, the thesis topics are announced in a specially created course within FEA Moodle.

3. It is acceptable to propose a group of topics for solving a wide-ranging task by several graduates and requiring teamwork up to a certain level. Even in this case, all requirements for assignment and thesis preparation should be met, including the requirement that each student makes an independently developed contribution.

4. The topic of the thesis must ensure the achievement of the goals of the graduation (section I.). In this regard, the topic of the thesis must refer to a task having a complex nature, including the stages of actual implementation and documentation of a certain task. For this reason, it should imply a study of literary sources, mastery of relevant theoretical statements and engineering methods, design and calculation of certain specific devices, circuits or systems, knowledge of hardware (technical) part or programming, assessment of applicability and economic indicators, etc.

In the thesis for the Bachelor's degree program, the graduate must be motivated to propose **specific engineering solutions**;

In addition to concrete engineering solutions, the thesis for the Master's degree program must also include **an element of research!**

In this regard, the thesis topic cannot refer only to a study or comparative analysis of certain technologies, equipment, software products, standards, etc. Such a general study or analysis can be contained only in the non-original part of the thesis - the overview chapter one.

5. Procedure for choice of a supervisor and specification of a thesis and thesis topic.

a/ The choice is made on the initiative of the graduate and with the consent of his preferred supervisor. Any specialist with a higher technical education in the field of the relevant specialty can be selected as supervisor of the thesis at FEA. In cases where the supervisor of the thesis is not a teacher at FEA, it is mandatory that such a teacher is selected as a consultant for the thesis.

b/ The graduate may be offered to indicate the topic himself, which may be outside the announced ones. After discussion with the teacher, it can be accepted, modified or changed by mutual agreement and approval by the department council. The signatures of the graduate and the supervisor on the thesis assignment certify their agreement with the topic and other requirements.

c/ One teacher cannot supervise more than 10 graduate students in total for all forms of education in one academic year, and one full-time doctoral student more than 6. A teacher or full-time doctoral student who has proposed less than a total of 4 thesis assignments is not entitled to refuse guidance to graduates and cannot set conditions for prior mastery of knowledge and skills not studied in the curriculum.



6. Procedure for preparing and approving a thesis assignment.

a/ In the period provided for the preparation of a thesis assignment in the curriculum and as per the schedule approved by the dean, the supervisor (and the consultant if such is appointed) together with the graduate prepare and sign the thesis assignment and submit it to the secretary of the department.

b/ The thesis is signed by the department head. In cases where the assignment does not meet the requirements, it is returned to eliminate the deficiencies or omissions indicated by the head of the department. After acceptance by the head of the department, the assignment is submitted by the technical assistant of the department to the faculty office of FEA for validation of the graduate status with a signature and approval stamp by the dean. The graduate receives the approved assignment in person at the faculty office of FEA.

c/ The approval of the thesis is carried out within the period specified in the accepted schedule of the study process for graduates.

d/ 3 copies of the thesis assignment are officially validated - one for the graduate (for binding in the thesis), one for the relevant department and one for the faculty office of FEA.

7. A sample thesis assignment form is presented in Appendix 1.

Content:

a/ In item 1 of the thesis, a specific engineering task that must be solved in the thesis is clearly formulated and the type of final results expected to be presented in the original part of the thesis are indicated.

b/ In item 2 of the thesis the following prerequisites for the thesis preparation are specified: sets of specific mandatory output data for the computational part and/or project implementation parameters and characteristics. If there is an experimental part, the type of experiments that will be conducted, as well as the format in which the results of the conducted experiments will be presented (time-diagrams, tables, graphs, etc.) must also be specified.

c/ In item 3 of the thesis assignment, several specific literary or other sources are given by name, which should serve for initial familiarization with the problem and guide the graduate to search for the remaining necessary sources.

8. Requirements for the thesis supervisor

a/ To explain to the graduate the goals of the thesis and the procedures related to graduation.

b/ To organize a rigorous work schedule for thesis preparation and to systematically consult and supervise the graduate (within the hours determined by the regulations).

c/ At the end, the thesis supervisor must give their written evaluation on the work of the graduate, which is presented to the state examination commission /SEC/. The thesis supervisor's evaluation is taken into account when specifying the assessment of the graduate's work and is taken into account in the process of grading.



III. REQUIREMENTS FOR THE PREPARATION AND CONTENT OF THE THESIS

The structure of the thesis is specified in the approved assignment and cannot be changed. The recommended volume of the thesis is essentially no less than 35 pages for bachelors, and 55 pages for masters students, structured as follows: title page and form according to Appendix 2a and 2b, approved thesis assignment; contents: introduction; presentation of the thesis by chapters; list of used literary sources; applications/appendix.

The content of the thesis must include the graduate's own development with a volume of description not less than 50% of the entire text.

The introduction contains a summary of the activities carried out by the graduate in the process of thesis project development.

The presentation of the thesis by chapters explains the process of development of the thesis. It precisely formulates the engineering problem to be solved and the requirements which the presented solution must meet. The graduate should mainly emphasize the engineering aspect of the work performed in the process of completing the task set in the thesis assignment. Subsequently, the graduate must present and analyze the obtained results.

The presentation part in master's theses must also contain an analysis of other decisions and a research element in justifying the specific choice of solution presented in the thesis.

Examples of structuring the presentation:

a/ for hardware development: aim and tasks; block diagram synthesis of the device; justification of the choice of element base; electrical circuit design; PCB design; testing and settings.

b/ for the development of a software system: aim and tasks; structure synthesis, system functions and user interfaces; designing block diagrams of algorithms, database formats, timing diagrams of communication protocols; program implementation - general structure, class hierarchy, comment on the source code of the program; experimental results.

The conclusion summarizes the main characteristics and features of the presented engineering solution, its advantages and disadvantages, the results of the experiments, their engineering interpretation and proposals for further work on solving the given problem.

Literary References: Each literary source in this list must be cited at least once in the thesis with its number.

References are arranged alphabetically by authors, first in Cyrillic, then in Latin. It is allowed to arrange the references in the order of their use in the text of the thesis (examples in Appendix 3):

For books: 1. Surname and initials of the first name of the first author, initials of the first name and surname of the second author, etc., 2. Title of the source, 3. Publisher, 4. Place of publication, 5. Year of issue. When the source does not have an author, start with the title.

For journal articles: 1 Surname and initials of the first author's first name, initials of the first name



and surname of the second author, etc., 2. Title of the article, 3. Name of the journal, 4. Issue number, 5. Year of publication, 6. Publisher, 7. Place of publication, 8. Page numbers of the beginning and end of the article.

For articles from collections: 1. Surname and initials of the first name of the first author, initials of the first name and surname of the second author, etc., 2. Title of the article, 3. Name of the collection, 4. Place of publication, 5. Year of issue, 6. Page numbers of the beginning and end of the article.

Appendices contain programs, source code, data structure formats, screenshots, obtained results, electrical schematics, PCB designs, reference data, and more.

The thesis should be printed on standard A4 size sheets with approximately 2000 (66 characters per line x 30 lines, 60 characters per line x 33 lines or 70 characters per line x 28 lines) characters per page, with text box borders 25x15 (left-right) and 20x20 (above and below) millimeters. Pages, formulas, figures, tables and appendices are numbered and named.

Each department heading a specialty can develop specific examples and requirements for the content of the thesis for the thus established structure.

IV. SUBMITTING AND REVIEWING THE THESIS

1. The graduate, after preparing the thesis submits it to the responsible thesis supervisor. The supervisor s gives a written evaluation on the level of accomplishment of the tasks posed in the thesis assignment in a special form, which is an integral part of the title page of the thesis (Appendix 2b). The form includes: declaration of originality of the work, signed by the graduate, supervisor's evaluation on the work done by the graduate; a proposal for a reviewer and the signature of the head of the department. The work is given to the secretary of the department for registration. The name of the reviewer is supplemented according to the decision made and confirmed with the signature of the head of the department. The reviewer can prepare a review only on a thesis approved by the supervisor with a written evaluation and admission to defense.

The head of the department appoints a reviewer no later than three days after the presentation of the work in the office of the department. Any specialist with a higher technical education possessing the necessary knowledge in the relevant field can be selected as a reviewer of the thesis. In cases where the supervisor of the thesis is not a teacher in a FEA department, it is mandatory that a teacher from a relevant FEA department be selected as a reviewer of the thesis. The graduate student submits the thesis to the reviewer no later than 7 days before the date of the defense.

2. The purpose of reviewing the thesis is to determine whether the tasks set in the thesis have been fulfilled. The review is used for providing a basis for allowing the graduate to defend the thesis and also is taken into account in preparing a proposal for assessment and grading of the thesis. The reviewer familiarizes himself with the content of the thesis and prepares a review answering unambiguously the specific questions from the review form. (Appendix 4).



3. Within a week, the reviewer prepares a review and submits it to the secretary of the department.
4. The graduate receives a copy of the review and is obliged to familiarize himself with it, as well as prepare a response to the remarks and questions noted by the reviewer.
5. A decision to not admit a student to the defense is made by the department council and/or the head of the department, based on the evaluations of the thesis supervisor and the reviewer.

V. ORGANIZATION AND CONDUCT OF THE thesis DEFENSE

1. The members of the State Examination Commission (SEC) for thesis defenses under article 103 (1) of the regulations are appointed by the rector of TU - Sofia based on the dean's report with proposals from the heads of the departments.
2. Thesis defenses are held by an order from the dean based on the report of the head of the department. The state commission for the Bachelor's degree program includes a minimum of 3 habilitated persons, and for the Master's degree program - a minimum of 4.
3. The dean's order specifies the date, place and time of the defense, the credentials and names of the chairman and members of the state examination commission. The date, place and time of the defense are publicly announced on the FEA website and in Moodle.
4. The thesis defense is public and it can be attended by experts external to the committee, students, relatives of the graduates, etc.

During the defense of each graduate, a minimum of 3 qualified members of the commission for the Bachelor's degree program and a minimum of 4 for the Master's degree program must be present in the hall.

6. The thesis defense takes place in the following order:

- statement of the graduate about the essence of the thesis:

The graduate prepares an oral presentation and illustrative materials. **The presentation must not be read.** Illustrative materials and demonstration models are used. Illustrative materials should reflect the results achieved in the thesis and help to present solutions quickly and clearly. These can include a presentation on a computer with a multimedia projector. The oral presentation on the essence of the thesis must take no more than 10 minutes for bachelors and 15 minutes for masters. Demonstrations of created products and prototypes can take up to 5 minutes. The exposition begins with "Respected Chairman and members of the State Examination Commission, colleagues and guests". Following is a presentation of the topic and the assigned task, thesis contents, accomplished results and demonstration. The exposition should show: the graduate's deep knowledge of the problem, whether the adopted solution is correct, as well as demonstrate what obtained results and outcomes. **It is especially important to show the personal contribution of the graduate and their independent decision-making in solving engineering tasks relating to the thesis.**



- Presentation of the review and responses to it;
- Answering questions posed by the members of the State Examination Commission, each question asked is recorded in the protocol book.

With the permission of the chairman of the commission, up to three short questions can be posed by the attending specialists who are not members of the State Examination Commission.

7. For each graduate, the State Examination Commission discusses the assessment of the thesis and its defense in accordance with the rules and regulations of operation. If no consensus is reached on the assessment, a decision is made by simple majority.
8. The evaluation of the thesis is based on the review, the evaluation of the supervisor and the graduate's answers to the questions aimed at clarifying the independence of the preparation of the work and the correctness of solutions proposed in the thesis.
9. The state examination commission evaluates the preparation of the thesis and its defense with one total mark, which is a whole number. For each thesis defense, the State Examination Commission assigns a grade based on the six-point system: excellent (6.00), very good (5.00), good (4.00), average (3.00) and poor (2.00).
10. All grades are entered in the protocol book and all the present members of the committee put their signatures in it. In the event of a poor grade, the committee decides whether the graduate should develop and defend a new thesis within a set deadline or appear for a second defense with the same thesis, entering their decision in the protocol book.

VI. RIGHTS AND SANCTIONS FOR GRADUATES

Graduates who do not have illustrative material that meets the set requirements are not admitted to the thesis defense. They appear for the thesis defense in the same session or in subsequent sessions.

Graduates who, for valid reasons, were prevented from appearing at the thesis defense under article 103 (5) of the regulations are allowed to defend with the old thesis assignment in the same session or in subsequent sessions provided in the schedule of the relevant academic year.

Graduates who have submitted their thesis work within the term provided for in the assignment, but have not appeared for the defense at the scheduled sessions, are allowed to defend with the next graduating class under article 103(6) of the regulations.

Graduates who have not successfully defended their thesis are allowed to defend it again in the next session according to article 103 (7) of the regulations.

Graduates who fail to develop their thesis in time for the regular and remedial sessions are deregistered from TU-Sofia. According to article 103 (8) of the regulations, they have a one-time right to develop a new thesis with one of the following graduation classes, but no later than 3 years.



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When, after the deadline for developing the thesis has passed, the graduate student presents a thesis and the supervisor does not agree with its content, the supervisor enters his negative evaluation and the thesis is submitted for review. It is desirable that the supervisor and reviewer of the thesis attend the thesis defense and participate in shaping the final evaluation together with the examination committee.





Appendix 1

Deadline: December 2024

Dean FEA:

Date:
(Assoc. Prof. M. Shopov, PhD)

THESIS ASSIGNMENT

Student:

Faculty № xxxxxx

Educational level: BEng/MEng

Specialty: Industrial Engineering

Subject:

1. Description of the specific engineering task and the type of final results to be solved in the original part of the thesis:

2. Digital input for the computing part. Functional requirements

3. Initial bibliographic and other sources:

4. Content of the thesis

- Title page (following a template)
- Original signed thesis assignment
- Contents
- Introduction
- Chapter 1 - Overview – state-of-the-art and trends;
- Chapter 2 - Formulation of design structure;
- Chapter 3 - Basic theory, analysis, synthesis, hardware and/or software development, design, block diagrams, justifications (*as applicable*);
- Chapter 4 - Computational part;
- Chapter 6 - Evaluation of the economic efficiency of the development (*if applicable*);
- Chapter 7 - Conclusions and claims for self-obtained results;
- References
- Appendix

Student:
(.....)

Supervisor:
(.....)

Consultant:
(.....)

Head of department:
Date:
(.....)



Appendix 2a

DIPLOMA THESIS

Bachelor/Master in Industrial Engineering

Title goes here

Student: John Doe

Faculty number: xxxxxx

Supervisor: Assoc. Prof. Jane Doe, PhD

Department/Faculty/Company

Plovdiv 2024



Appendix 2b

DECLARATION OF ORIGINALITY OF THE DIPLOMA THESIS

I, the undersigned,, a student in the Industrial Engineering degree course in the Faculty of Electronics and Automation at the Technical University of Sofia, Plovdiv Branch, graduating during the 20xx/xx academic year, faculty No: xxxxxx, declare that the foregoing implementation of the specific tasks related to my final year project, entitled:

.....
.....

with supervisor:

in the volume of text pages and pages with annexes, including number of figures:, number of tables:, is the result of my own work.

Date: dd.mm.yyyy

Student:
(.....)

A REVIEW OF THE DIPLOMA THESIS BY THE SUPERVISOR

The diploma thesis is performed according to the assignment in full volume / in the volume of % (please underline the correct answer and if the implementation is less than 100 %, a motivation should be filled in and it is mandatory required upon admission to the presentation of a final year project)

and may / may not be admitted to presentation.

Motivation:.....
.....
.....
.....

Supervisor:
(.....)

Selected reviewer:

Head of department:

Date:
(.....)



Appendix 3

Citing books

Indicate: 1/ Surname and initials of the personal name of the first author, initials of the personal name and surname of the second author, etc.; 2/ Title of the source; 3/ Publishing house; 4/ Place of issue; 5/ Year of issue. When the source has no named author, start with the title.

Books with no more than three authors:

- [1] Boyanov Y., E. Shoikova, Theory of electronic circuits. Sofia, Technica, 1989.
- [2] Rashid, M., Power Electronics: Circuits, Devices & Applications. 4th Edition
- [3] Oskay, W., E. Schlaepfer, Open Circuits: The Inner Beauty of Electronic Components. November 1, 2022

Books with more than three authors:

- [4] Velkov S. et al., Electronic and semiconductor elements and integrated circuits. Sofia, Technica, 1992.

Books edited by one of the authors:

- [5] Reference book on conversion technology. In order. I. M. Chizhenko, Kiev, Technics, 1978.

Citing journal articles

Indicate: 1/ Surname and initials of the personal name of the first author, initials of the personal name and surname of the second author, etc.; 2/ Title of the article; 3/ Name of the magazine; 4/ Consecutive issue; 5/ Year of issue; 6/ Publishing house; 7/ Place of issuance; 8/ Pages at the beginning and end of the article.

- [6] Trifonov, R., G. Pavlova, I. Pavlov. Models of intelligent behavior of a walking robot when moving on slopes and stairs, Automation and Informatics, No. 2, 2017, pp. 3-8.

Citation of Articles from Proceedings of Scientific Organizations:

Indicate: 1/ Surname and initials of the personal name of the first author, initials of the personal name and surname of the second authors, etc.; 2/ Title of the article; 3/ Name of the collection; 4/ Place of issuance; 5/ Year of issue; 6/ Pages at the beginning and end of the article.

Citation of conference papers

Indicate: 1/ Surname and initials of the personal name of the first author, initials of the personal name and surname of the second authors, etc.; 2/ Title of the report; 3/ Name of the conference; 4/ Venue; 5/ Year of implementation; 6/ Pages at the beginning and end of the article (if a collection of reports has been published).

- [9] Kolev I., B. Alexandrov, Application of optocouplers with field-effect phototransistors, Report from the national conference "Electronics 96", Botevgrad, House of Science and Technology, 1996.
- [10] Diaz, J., F. Metcalf. An analytic proof of Young's inequality, Amer.Math.Monthly,no77, 1970, pp. 603–609

Citation patents and copyright certificates

- [11] P. No. 60828, RB. MPK, GO2C 7/10, Aleksandrov D., Colored glasses. A. c. No. 50917, HPB, MPK H01L29/78

Citation of electronic sources

Indicate: 1/ Surname and initials of the personal name of the first author, initials of the personal name and surname of the second author, etc.; 2/ Title of the article; 3/ Year of publication, Link to the publication or DOI code.



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- [12] Tuzharov., Information systems, 2007, <http://www.tuj.asenevtsi.com/Inf systems/>
- [13] Bailey, St., Rapid ASIC Design for Digital Signal Processors, 2018, <https://www2.eecs.berkeley.edu/Pubs/TechRpts/2020/EECS-2020-32.pdf>
- [14] Kidav, J.,NM Sivamangai,MP Pillai,Sreejeesh SG, Design and Physical Implementation of Array Signal Processor ASIC for Sector Imaging Systems, 32nd International Conference on VLSI Design and 2019 18th International Conference on Embedded Systems (VLSID), January 2019, DOI:10.1109/VLSID.2019.00095

