LATVIA UNIVERSITY OF LIFE SCIENCES AND TECHNOLOGIES
Faculty of Information Technologies

BACHELOR'S THESIS DEVELOPMENT AND DEFENCE IN THE ENGINEERING SCIENCE STUDY PROGRAM "COMPUTER CONTROL AND COMPUTER SCIENCE" AND IN THE INFORMATION TECHNOLOGY PROFESSIONAL STUDY PROGRAM "INFORMATION TECHNOLOGIES FOR SUSTAINABLE DEVELOPMENT"

Methodological Regulations

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CONTENT

INTRODUCTION

The Methodological Regulations are intended for students and lecturers of the LBTU IT faculty as informative material regarding the development of bachelor's theses for obtaining an Engineering Bachelor's Degree in Computer Control and Computer Science and Bachelor's Degree in Information Technology. The Regulations describe the main activities to be carried out during the development of the bachelor's thesis, recommendations for the development of the thesis, requirements for the content and structure of the thesis, as well as recommendations for supervisors and reviewers. In addition to these Methodological Regulations, issues related to final examinations are discussed in the LLU Study Regulations, LLU Regulations on Final Examinations, the rector's order Regarding the Verification of the Final Thesis in the Plagiarism Control System, the vice-rector's order on the Procedures for Submitting Electronic Copies of Final Theses and Their Verification in the Plagiarism Control System, in the rector's order On Violations of Academic Integrity in final works/doctoral theses, as well as in the Academic Integrity Regulations.

The Methodological Regulations describe the procedure for the performance of the following functional duties related to the development of bachelor's theses:

Functional duties	Explanation
Bachelor's thesis consultant	Due to the specificity of the topic, an employee of the relevant field is assigned to the student's work and provides professional consultations
Bachelor's thesis reviewer	A faculty member or an IT employee approved by the dean's order, who familiarises himself/herself with the work developed and provides an objective assessment of it, points out the possibilities of its practical application, as well as shortcomings
Bachelor's thesis supervisor	LBTU teaching staff or an IT company employee approved by the dean's order, who provides the student with methodical assistance during the development of thesis, advises on professional issues and guides the student's independent work
Bachelor's theses coordinator	A faculty member/doctoral student or an employee of the department appointed by the head of the FIT Department of Computer Systems (hereinafter, DSK), who is responsible for organising the development of bachelor's theses and coordinating the process
DSK registrar	Documentation specialist or registrar of the Department of Computer Systems (DSK) who receives, registers and processes printed and electronic documents related to the development of bachelor's theses
Director of the study programme	Directors of the FIT bachelor's study programme "Computer Control and Computer Science" and professional higher education bachelor's study programme "Information Technologies for Sustainable Development"
SEC responsible secretary	A FIT teaching staff appointed by the order of the FIT dean who is responsible for coordinating the bachelor's thesis development process, receiving final bachelor's theses and organising the work of the State Examination Commission

The calendar schedule for the development of bachelor's theses (hereinafter referred to as the Schedule) is approved at the beginning of each study year. In order to describe the progress of the thesis development, the most important activities and main informative measures are listed in the table below (this material only shows the chronological order of the activities and the approximate time intervals, but during the work development it is mandatory to follow the approved Schedule):

Activity	Time period
Approval of the bachelor's thesis development schedule at DSK	September
Informing 4th year students of FIT (initial information regarding the development of a bachelor's thesis in electronic form)	September
Bachelor's thesis topics and supervisor selection (negotiations)	September
Submitting the bachelor thesis title and supervisor data to the bachelor thesis coordinator (electronically in free form)	October
Submission of the task of the bachelor's thesis to the coordinator (form in electronic format)	November
Coordination of the bachelor's thesis task (forms in electronic format) with the head of the department, the director of the study programme, the chairman of the SEC of the professional study programme	November
Approval of bachelor's thesis tasks at DSK	November
Version 1 of the draft of the bachelor's thesis (title page, introduction, table of contents, outline of section 1 of the theoretical or practical part (volume at least 12–15 pages), list of sources and literature). The draft is submitted in **electronic form in e-studies, in the course "*Bachelor thesis*"** (InfT4032), 2 CP. **The submitted topic description will form the assessment of the bachelor's thesis for the fall semester**	**January**
Examination of the submitted drafts at DSK	**January**
Clarification of the task of the bachelor's thesis	**March–April**
Student application (registration) in DSK for pre-defence of theses	March
Pre-defence of bachelor's theses (presentation of the student's short report on the bachelor's thesis and draft of the thesis in electronic form) **A successful pre-defence of the work will form the assessment of the bachelor's thesis for the spring semester**	**April** (no later than three weeks before the FT submission, in accordance with the Regulations on Final Examinations)
Recommendation of the department for the dean's decision on the admission of a bachelor's thesis for defence (successful evaluation of the pre-defence of bachelor's theses)	May
Submission of a fully completed (bound) and signed bachelor's thesis to the secretary of SEC	**May**
Student application (registration) for defence with the SEC secretary	May
Receiving feedback from supervisors of bachelor's theses	May
Review of bachelor's theses	May
Defence of bachelor's theses	**May – June**

During the development of bachelor's theses, the actions performed at individual intermediate stages are approved by the decisions or orders of the DSK sessions or the FIT dean. After this approval, changes can only be made with re-approval. The most important actions are as follows:

Activity	Time period	Type of documentation
Approval of the bachelor's thesis topic application by DSK	November–December	An electronic form for the thesis topic application, an extract from the minutes of the DSK meeting attached to the DSK bachelor's theses record file, which indicates the student's name, surname, title of the topic and supervisor

Activity	Time period	Type of documentation
SEC technical secretariat approval	February	Proposals of the SEC secretary on the composition and duties of the technical secretariat submitted to the dean's office
DSK decision (proposal) on SEC work schedule (determination of defence days)	April	An extract from the minutes of the DSK meeting submitted to the dean's office, indicating the dates for the defence of bachelor's theses
DSK's recommendation for approval of topics, supervisors and reviewers of bachelor's theses	April–May	An extract from the minutes of the DSK meeting submitted to the dean's office, indicating the student's name, surname, title of the topic in Latvian and English, supervisor, consultant and reviewer
Dean's order on approval of the SEC work schedule	April–May (not later than one month before the commission's first meeting, in accordance with the Regulations on Final Examinations)	Dean's order indicating the dates and times for defence of bachelor's theses
Dean's order on the approval of topics, supervisors and reviewers of bachelor's theses	May	Dean's order indicating the student's name, surname, title of the topic in Latvian and English, supervisor, consultant and reviewer
Recommendation of the department on the readiness of the bachelor's thesis to be defended (after the results of the pre-defence session of the department/institute)	At least 3 working days before the dean's order on admitting the student to defence	An extract from the minutes of the DSK meeting, which indicates the student's name, surname and title of the topic in Latvian, submitted to the Dean's Office
Dean's order on admitting a student to defence	No later than two weeks before the start of the commission's activity, in accordance with the Regulations on Final Examinations	Dean's order indicating the student's name, surname and matriculation number

1. SELECTION OF THE TOPIC OF THE BACHELOR'S THESIS

A **bachelor's** thesis is an independent theoretical study or practical development in which the student systematises, expands and strengthens the acquired theoretical knowledge and proves his/her theoretical maturity, demonstrating the ability to apply theory in practice. The student develops and defends the bachelor's thesis at the end of the theoretical course.

The aim of the academic bachelor's study programme is to provide students with the acquisition of theoretical knowledge and research skills in the basic field of computer control and computer science. The main task of the academic bachelor's study programme is to provide students with a scientific basis for professional activity, developing the abilities of scientific analysis and the ability to solve problems independently, as well as to prepare students for further scientific research studies.

The aim of the professional bachelor's study programme is to provide practical professional studies that are based on the theoretical foundations of the sciences of the information technology field, and that comply with professional standards. The tasks of the professional bachelor's study programme are:

- to educate fifth-level professional qualification specialists who are needed for the improvement of the national economy and national security in the field of information technology, as well as to foster their competitiveness in the changing socio-economic conditions and the international labour market;
- to implement in-depth knowledge acquisition specific to the field of information technology, which provides the opportunity to develop new or improve existing systems, products and technologies and prepares for creative, research and teaching work in the industry.

1.1. Bachelor's thesis topic sources

The sources and methods of selection of the topic of the bachelor's thesis can be different, but its selection shall take place at the initiative of the student.

When choosing a topic, it is recommended to consider the following:

1) a student shall choose a related field of the bachelor's thesis topic;
2) a student shall clarify an existing problem (question) in this field, which for known reasons needs to be solved or is of interest;
3) a student shall determine what he/she could do in his/her thesis to solve the chosen problem or issue.

There are various options for choosing the topic of a bachelor's theses:

1) the student can choose one of the topics for its bachelor's thesis offered by the relevant department. For this purpose, seminars are organised at the beginning of the semester, in which the lecturers of the departments talk about the existing scientific and practical topics, within the framework of which it is also possible to develop bachelor's theses;
2) the student itself can initiate the development of the topic of its interest according to the subject programme and conditions, in coordination with the teaching staff;
3) the student itself can initiate the development of the topic of its interest, which is related to the task to be performed at its current workplace;
4) a bachelor's thesis can also be developed on the basis of the term paper (project), supplementing and further expanding the topic discussed therein;
5) the source of the topic of bachelor's theses may be related to the tasks performed in professional qualification internship (during 3rd and 4th year).

The bachelor's thesis of the academic study programme shall necessarily include an examination of the problem, an analysis, a justification for the implementation. In the development of a bachelor's thesis, only practical work with a specific software tool is not allowed, without emphasising the application to achieve the set objective.

The topic for the development of professional bachelor's theses shall be related to one of the stages (tasks) of the life cycle of real software for the execution of the tasks of basic processes, support processes or organisational processes.

The teaching staff can reject the student's choice if, due to various circumstances, the successful preparation of the thesis is not possible. The teaching staff justifies their opinion, and by mutual agreement with the student, another topic is chosen.

The topic shall reflect the intended contribution of the student, it cannot be too general and comprehensive. For example, the wording "... methods to be used" does not indicate what and why these methods will be used, but the number of known methods can be very large. Definition is given by such formulations as, for example, "... comparison and evaluation of the methods to be used", "... selection of a method for solving the XXX task", etc.

The use of abbreviations and acronyms should be avoided in the wording of the topic, as well as excessively long wording (the title should fit in no more than three lines on the title page).

Before approving the topics of the bachelor's theses, the wording of the submitted topics and compliance with the requirements of the bachelor's thesis are evaluated, and it is also ensured that several bachelor's theses do not have identical topics.

The topic of the bachelor thesis shall be chosen by the middle of the first semester of the last study year.

When choosing a bachelor's thesis supervisor, it is necessary to take into account the compliance of his/her professional qualifications with the requirements set for supervisors of theses related to the IT field. A bachelor's supervisor requires a master's degree in engineering in a relevant specialty. In exceptional cases, a specialist with an appropriate bachelor's degree can be the supervisor of the bachelor's thesis, if he/she has at least 5 years of successful work experience in IT industry company(s). The compliance of each specific supervisor with these requirements is evaluated by the department.

It is also possible to attract a consultant to the work, and this is especially desirable in cases where an interdisciplinary bachelor's thesis topic is chosen.

NOTE! In order for the selection of the topic, coordination and the entire further development of the bachelor's thesis to take place promptly and in accordance with the requirements, all students shall provide the coordinator of the bachelor's thesis with their e-mail address and check this contact address regularly.

1.2. Bachelor's thesis task

During the selection of the topic, the potential content of the thesis is also discussed, which should be briefly described in the "Objective and tasks of the bachelor's thesis" in the bachelor's thesis form. The form can be obtained in electronic format on the faculty's website in the Studies/Bachelor's and master's thesis development section.

All required fields shall be filled in and the form shall be submitted in electronic format (by e-mailing a completed form in the form of a document or by filling out an electronic form) to the coordinator of bachelor's theses within the specified deadline.

If any comments or requested changes are received during the coordination of the topic, the bachelor's theses coordinator informs the student about it, indicating the deadline for fulfilling the requirements. This specified deadline shall be observed when submitting (sending by e-mail) the corrected bachelor's thesis in electronic format to the bachelor thesis coordinator.

Bachelor theses topics are recommended for approval by the decision of the department meeting, about which students are informed within 5 working days (the topics are approved by the dean's order).

NOTE! The topic of the bachelor's thesis, supervisor and reviewers are approved by the order of the dean, which is prepared on the basis of the decision of the department meeting. The title of the developed bachelor's thesis shall be the same as in the order. Changing or

correcting the approved thesis topic, even if one word is changed in the title, is possible only in exceptional cases, following the previous approval procedure (special attention should be paid to the need to correct the title of the topic in the spring, during the pre-defence of bachelor's theses).

NOTE! If the student has applied for the topic in the previous year of study, but for objective reasons has not defended it and is on academic leave, the topic, the submission of the bachelor's thesis and the entire further process of developing the bachelor's thesis shall be repeated.

2. BACHELOR'S THESIS DEVELOPMENT

A bachelor's thesis is an independent work, during the development of which the author shall demonstrate the ability to use the knowledge acquired during his/her studies and his/her ability to plan the work to be performed within a certain period of time. The bachelor's thesis shall be arranged in a clear and logical sequence, observing the requirements for the content of the thesis described in this document and the Methodological Regulations "Structure of term paper, bachelor's theses and master's theses". The bachelor's thesis shall be developed and publicly defended in strict accordance with the Schedule.

An important control moment in the development of bachelor's theses is the pre-defence of the bachelor's theses, which takes place in the middle of the spring semester. Before the pre-defence, in accordance with the Schedule, the student shall submit to the coordinator of bachelor's theses the paper theses based on the bachelor's thesis to be developed in printed and electronic form (the theses shall be designed in the manner specified in the requirements of the annual FIT student and master's scientific conference and shall be coordinated with the supervisor).

The results of examination of bachelor's theses are summarised in the department's decision on the approval of recommendations regarding the topic, supervisor and reviewer of the bachelor's thesis, which is submitted to the FIT dean's office.

Justified reasons are usually not applied to the delay in the deadline for submitting the bachelor's thesis. In exceptional cases (prolonged illness, etc.), the deadline for submitting the thesis can be extended by the order of the dean. Therefore, the choice of the topic of the bachelor's thesis, the coordination, development and presentation of initial data should be done in a timely manner, providing a certain period for unforeseen circumstances and complications.

3. PRE-DEFENCE OF THE BACHELOR'S THESIS

1. The pre-defence of the bachelor's thesis takes place in the middle of the spring semester (usually in April, the dates are precisely determined in the Schedule for the development of bachelor's theses for the current academic year), and it takes place in a face-to-face meeting, preferably in the presence of at least 3 faculty members.

2. Before the pre-defence of the thesis, the student shall sign up for the examination of the works at the DSK according to the approved schedule.

3. During the pre-defence, the student shall **present a draft of the bachelor's thesis** in electronic form and present the bachelor's thesis to be developed.

4. The student presents (10 min.) the research carried out in his/her work:

    4.1. introduces himself/herself, the topic of the work and the supervisor to those present,

    4.2. formulates the set objective and the tasks (WHAT needs to be done to achieve the objective?),

    4.3. justifies the choice of the specific solution (HOW can it be done?),

    4.4. talks about the work done (WHAT was done?)

    4.5. presents conclusions and proposals, emphasising the author's developments,

    4.6. provides his/her assessment of the degree of work readiness.

5. After the report, the teaching staff and those present ask questions about the content of the thesis, and the student shall answer them briefly and accurately.

6. Every day, after the pre-defence of all theses, a decision is made about the degree of readiness of the thesis and the possibility to participate in the defence of the final theses.

7. If the pre-defence has been unsuccessful, a decision is made at the DSK meeting not to recommend the author of the work to be included in the order on the admission of the work for defence. In exceptional cases, the thesis may be referred for a repeated pre-defence after making appropriate improvements, according to the remarks, recommendations and reprimands made at the meeting.

8. After a successful pre-defence, following the suggestions and reprimands expressed at the DSK meeting, the student improves the bachelor's thesis and submits it to the secretary of SEC within the deadline specified in the schedule for developing the bachelor's thesis.

4. STRUCTURE AND CONTENT OF THE BACHELOR'S THESIS

The formal requirements of the work structure and the arrangement of the details are described in separate *Methodological regulations on structure of term papers, bachelor's theses and master's theses*, and this document only deals with the structural parts of the bachelor's thesis that relate to its content.

4.1. Structure of the thesis

The bachelor's thesis shall include the following sections:

1) first pages (title page, abstract, table of contents);
2) introduction (objective and tasks of the work, overview of the work, definitions and abbreviations);
3) main part of the work (theoretical part, description of the solution, practical application);
4) summary
5) conclusions and proposals;
6) literature (list of used literature and other sources of information);
7) appendices;
8) informative pages (author's guarantee, evaluation page).

4.2. Abstract

The abstract is a short and precise reflection of the work, which does not exceed one page. The abstract shall be created according to the sample that is added in library catalogues – it should include two types of information:

1) formal description of the work – author of the work, title of the work, brief description of the scope of the work: city, year, number of pages (up to the appendices), tables, figures, information sources and appendices;

2) a brief description of the content of the work, emphasising the author's research. This description should not duplicate the task of the bachelor's thesis. After reading the abstract, the what, why and how described in the bachelor's thesis should be clear.

References to specific sections of the work and used literature sources are not used in the abstract.

The abstract shall be written in two languages (each on a separate page): Latvian and English. A sample of the abstract is given in the appendix, as well as in the sample of the bachelor thesis, which can be downloaded in electronic form on the faculty's website in the section Studies/Bachelor's and master's thesis development.

4.3. Introduction

The task of the introduction is to provide an idea of the bachelor's thesis. The introduction is a separate section without sub-sections, but contains certain types of information.

4.3.1. The objective and tasks of the bachelor's thesis

In this section, the scope and relevance of the topic of the bachelor's thesis should be described, the objective and the tasks set for its achievement should be precisely formulated. The description should not be long, no more than 2 pages.

4.3.2. Overview of the bachelor's thesis

This section provides an overview of the work's content (excluding the first pages). Indicates how many sections the thesis description consists of and briefly explains the content of each section (characterises what kind of information is given in the respective section, but the explanation should not duplicate the title of the section).

4.3.3. Definitions and designations

If the bachelor thesis uses abbreviations and concepts that are not clearly understood, they shall be explained. The most important concepts used in the bachelor's thesis and their definitions are usually presented in the form of a table (the table does not need to be numbered), with the entries arranged in alphabetical order.

The symbolic designations or acronyms used in the work and their explanations are arranged in a separate table in alphabetical order. If there are no such designations in the work, or if only generally accepted designations are used in their traditional meaning (for example, IT – information technology), then this section may be omitted.

4.4. The main part

The main part of the bachelor's thesis shall be logically structured, written in literary language, using business language style and professional terminology, and be appropriately designed. A student shall make references to the used sources of information, design tables, figures and other elements in accordance with the requirements of the Methodological Regulations.

The discussion of the topic is usually divided into three blocks.

In the first block, it is desirable to describe the current state of the problem and the known experience in solving it. Here, the author demonstrates his/her ability to select and

review literature and other materials, as well as draw conclusions. It should be taken into account that the existing state of the problem, techniques and methodology should not be considered in general, but in a specific context that corresponds to the objectives and tasks of the thesis.

The theoretical part of the bachelor's thesis of the <u>academic</u> study programme shall be of a distinctly analytical nature. It shall form a justification for the problem given in the task and the chosen directions for achieving the set objective (problem solution paths). The theoretical part of the theses of the <u>academic</u> study programme shall preferably be larger than the theoretical part of the theses of the <u>professional</u> bachelor's programme.

The theoretical part of the <u>professional</u> bachelor's thesis shall be related to the chosen stage of the life cycle of real software and the work provided for in it. The specific model of the life cycle of the developed programme should be considered and the work to be performed in it should be justified.

The second block shall describe the solutions proposed by the author and their justification.

The third block shall describe how these solutions were implemented and what results were obtained.

The volume of the main part of the bachelor's thesis is **recommended to be between 40 and 70 pages**, and the first block shall not exceed the total volume of the second and third blocks. The pages starting with the introduction and ending with the list of sources and literature are counted in the volume of the main part.

NOTE! **The volume** of the main part of the bachelor's thesis **shall reach at least the minimum specified limit**. Too little volume of the main part of the bachelor's thesis may be the reason for not allowing the thesis to be defended.

If the work is dedicated to the development of specific software, the amount of programmable units should be indicated, the relationship of the specific development to a certain stage of the life cycle should be reflected on, and all stages of the life cycle of the specific software development should be described. If the specific software is developed or used in the works of the <u>academic</u> study programme, then not only the course of its development, but also what solutions and for what purpose can be obtained with the help of this software should be reflected on.

If the majority of the work consists of programming, then its recommended volume should be at least 800 executable commands (this requirement is only indicative, since the number of lines only partially determines the workload of the software).

4.5. Summary

The results of the work (what exactly has been researched, developed, implemented, etc.) should be described within the framework of one page. In this section, information can also be provided if, in connection with the topic of the thesis, its author has participated in a project (indicating name of the project, place, position held), Latvian or international scientific conference (indicating name, place, time), or has prepared a scientific article and whether this scientific article is accepted for publication (indicating the author(s) of the article, title, edition, number of pages).

4.6. Conclusions and proposals

Conclusions and proposals should be written in the form of theses, guided by the objective and tasks of the formulated work and based on the results obtained in the work.

The conclusions are based only on the materials presented in the sections. They should be specific, provide answers to the tasks set, and show their creative contribution. As far as possible, the fact of whether the defined tasks have been fulfilled and whether it will be possible to achieve the set objective should be reflected on. Conclusions should reflect the knowledge gained by the author of the work, and not generally known things read in literary sources.

In the proposals, the author should show the ways of solving a certain problem, resulting from the summary of the research.

4.7. List of sources and literature

The list of sources and literature is drawn up according to the Methodological Regulations. The total number of sources is not less than 10 and it is recommended that the number of internet resources does not exceed 1/3 of the total number.

4.8. Appendices

Various auxiliary materials that are not included in the main content of the work are added to the work as appendices. If the appendices exceed 100 pages, they can be attached electronically.

4.9. Informative pages

In the final part of the work, pages containing formal information about the work shall be added.

4.9.1. Author's guarantee

This page contains a statement signed by the student that the work is personally designed and not plagiarised. A sample of the author's guarantee is provided in the bachelor's thesis draft, which is available electronically on the faculty's website in the Studies/Bachelor's and master's thesis development section.

4.9.2. Decision of the State Examination Commission

Instead of the decision of the State Examination Commission, a blank form is inserted during the preparation of the bachelor's thesis, which is filled in after the defence of the bachelor's thesis. A sample is provided in the bachelor's thesis draft, which is available electronically on the faculty's website in the Studies/Bachelor's and master's thesis development section.

5. PREPARATION OF BACHELOR'S THESIS

The bachelor's thesis can be prepared in 1 or 2 copies, one of them shall be bound in hardcover, the other can be spiral-bound (if the student wishes, both copies can be bound in hardcover). The second copy is returned to the student after defending the thesis.

The electronic version of the thesis shall be uploaded to LBTU IS using the student's user account and password. In addition, the abstract of the final thesis (FT) shall be copied or written in Latvian and English in the input fields of LBTU IS. The permissible length of each abstract of a bachelor's thesis (including spaces) is limited to 850 characters. The electronic version of the thesis shall be uploaded to the system before the submission of the printed version of the thesis. It is possible to re-upload the FT file before the submission of the printed copies.

The bachelor's thesis file uploaded to LBTU IS shall meet the following requirements:

- all parts of the work (title page, introduction, main text, figures, tables, appendices, list of sources and literature, table of contents, etc.) shall be contained in one file;
- file format – PDF *(Portable Document Format),* size up to 50 MB;
- files converted from MS Word .doc (.docx) format to PDF shall not display watermarks and ad texts of conversion programmes;
- the file shall not be a scanned text image;
- the file shall not be password protected (locked);
- the file name shall use letters of the Latin alphabet and shall not contain diacritic marks (softening marks, lengthening marks, etc.);
- the name of the file shall contain the student's surname, first name and matriculation number, *e.g.,* "Ozolins_Janis_LI13094.pdf";
- in the file settings ("File/Properties"), the work name (Title) and author (Author) shall be specified.

6. SUBMISSION OF BACHELOR'S THESIS FOR DEFENCE

A student can submit a successfully pre-defended and improved bachelor's thesis in one of the following ways.

- A printed and bound bachelor's thesis with the author's and supervisor's signatures on the title page of the thesis shall be submitted to the secretary of the SEC commission or to a person appointed by the faculty within the deadline specified in the bachelor's thesis development schedule, but no later than 10 working days before the first session of the commission's work. The title page of the thesis is also signed by the consultant(s), if it has been officially approved.

- The bachelor's thesis is submitted electronically signed with a secure electronic signature. The work shall be electronically signed by everyone whose signatures have to be on the title page of the thesis, e.g., the supervisor, consultant, head of the department, etc.

A student shall upload the electronic file in accordance with the order of the vice-rector for studies "On the Procedure for Submitting Electronic Copies of Final Theses and their Verification in the Plagiarism Control System" to the LLU Information System (LLU IS) using their LLU IS user account.

All submitted FTs are verified in the integrated plagiarism control system. If signs of plagiarism are detected, the faculty shall take measures in accordance with the rector's order "On Violations of Academic Integrity in Final Theses/Doctoral Theses".

The feedback from the bachelor's thesis supervisor shall be submitted to the secretary of SEC no later than the deadline specified in the thesis development schedule.

NOTE! The student shall inform the SEC secretary in a timely manner and submit or electronically send his/her supervisor's contact information if the student's supervisor is not a FIT faculty member. The SEC secretary electronically sends the reference form to the supervisor, as well as information about the deadline and procedure for submitting the feedback.

A form is provided for the supervisor's feedback, the template of which is available electronically on the faculty's website in the Studies/Bachelor's and master's theses development section.

A bachelor's thesis may not be recommended for defence at the SEC if the thesis has not been presented in the pre-defence, the scope of the thesis is inadequate, the chosen methodology is incorrect, the thesis is not properly structured, the prescribed submission procedure has not been followed or there are other similar violations.

NOTE! Students shall find out in time whether there are any previous tuition debts. Determining and monitoring these debts is under the responsibility of the Dean's Office, therefore it may happen that a student whose work has been deemed ready for defence by the department is not allowed to defend the thesis. **All types of debts shall be settled no later than a day before the FIT dean's order on admitting a student to defence.**

After the formal examination of the submitted work, the secretary of the SEC sends an e-mail to the reviewers of the work with instructions on the procedure for preparing and submitting the review. The reviewer sends his/her evaluation without an evaluation mark to the secretary of SEC. The secretary of SEC sends this evaluation electronically to the author of the work. In printed form, the reviewers and supervisors submit forms with work evaluation and printed versions of reviewed works to the secretary of SEC within the deadline specified in the schedule. The draft review form is available electronically on the faculty's website in the Studies/Bachelor's and master's thesis development section.

Based on the recommendation of the department and the student's performance (debt) information from the dean's office, the dean of FIT issues an order on the admission of bachelor's theses for defence (not later than two weeks before the start of the commission's activity, in accordance with the Regulations on Final Examinations).

The calendar schedule for the defence of bachelor's theses, indicating the order of the applicants' presentations, is drawn up by DSK. The schedule shall be openly published at least 2 days before the start of the work of SEC. Usually, the schedule is published in a shared directory using a cloud-based file storage and synchronisation service, and remote access to this directory is provided for students, supervisors, SEC committee members and reviewers.

7. REVIEW OF BACHELOR'S THESIS

Reviewers of bachelor's theses are appointed by DSK. Persons with higher education in the field in which the work is being developed or in a related field can be approved as a reviewer, if the specialist works in a company, institution or organisation that is practically interested in the research conducted in the bachelor's thesis. Invited specialists or competent LBTU teaching staff, scientists and doctoral students of the relevant field can be approved as reviewers.

The reviewer, who is a teaching staff member of LBTU, is provided with access to the bachelor thesis in the LAIS system no later than 10 days before the defence of the thesis. For reviewers who are not LBTU teaching staff, the work is usually sent electronically to the e-mail by the secretary of SEC with instructions on the procedure for preparing and submitting the review. When sending an e-mail, the reviewer is also notified of the required review submission deadline. The draft review form is available electronically on the faculty's website in the Studies/Bachelor's and master's thesis development section.

If a programme has been developed as part of the bachelor's thesis, the reviewer has the right to ask the student to present it.

No later than one working day before the start of the Commission's work, the student is entitled to familiarise themselves with the review of their bachelor's thesis.

8. DEFENCE OF THE BACHELOR'S THESIS

After the review of the theses, public defence of the bachelor's theses takes place within previously determined and announced deadlines. Defence of the work begins with the student's report (15 min.). At the beginning of the report, the student shall introduce himself/herself, the topic of the bachelor's thesis and the supervisor of the bachelor's thesis to those present. Next, it is necessary to clearly formulate the set objective and the work tasks (WHAT needs to be done to achieve the objective?), then justify the choice of the specific solution (HOW can it be done?), then tell about the work done (WHAT was done?). At the end of the report, the conclusions and proposals are presented, emphasising the author's developments. If possible, the desired continuation of this work is indicated.

For the purpose of the report, the student shall prepare a presentation of his/her work, which will be demonstrated using a multimedia projector. Therefore, it is necessary to inform DSK in time and agree on the necessary and possible hardware and software to be used during the presentation. In some cases, handouts for the commission can be prepared.

After the report, members of the commission and those present can ask questions about the content and presentation of the work, and the student shall answer them briefly and accurately.

After answering the questions, the supervisor's feedback and the review are read.

NOTE! Since the reviewer's and supervisor's assessment is only part of the information that forms the summative assessment, it is preferable that neither the supervisor's nor the reviewer's recommended grade is mentioned, but it is stated whether the work corresponds to the bachelor's degree to be awarded.

After reading the review, the author of the thesis is given the final word, where the author can respond to the reviewer's comments, as well as to previously unanswered, incomplete or incorrectly answered questions. The student's final speech shall not exceed 5 minutes, after which there are no questions or discussion.

NOTE! The student may disagree with the reviewer's reprimands, but then he/she shall prove his/her point of view with practical and work-based arguments.

Every day, after the defence of all theses, a closed session is held, during which the commission performs the final evaluation of the defended works, taking into account the reviewer's opinion, the supervisor's feedback and the student's ability to defend his/her work, as well as the knowledge demonstrated during the defence.

Defence results are evaluated based on the ten-point system. If the evaluation is lower than four points, the commission makes an additional decision, in which it is indicated whether the author of the thesis has the right to defend an improved thesis again or whether it is necessary to choose a new topic. The student has the right to re-submit the work for defence within three years after passing the theoretical course.

The assessment of the bachelor's thesis, including unsatisfactory assessment, is recorded in the SEC meeting minutes book, on the decision page of the State Examination Commission attached to the bachelor's thesis and registered in the student's register of achievements.

ABSTRACT

Bērziņš J. Development of a new image segmentation method: bachelor's thesis. Jelgava: LBTU, 2017. 78 pages, 10 figures, 3 tables, 15 sources of information, 3 appendices.

The bachelor's thesis examines several existing algorithms of image segmentation methods and the shortcomings of these methods. In addition, various image enhancement techniques are described, which can be used to increase the quality of the image segmentation result.

For the purposes of developing a new segmentation method, several algorithms are offered, including segmentation algorithms independently developed by the author and image enhancement techniques. A programme has been created for the study of algorithms, which allows comparing the proposed methods, and an analysis of these algorithms has been carried out.

A new image segmentation method has been developed during the work, which uses both image enhancement techniques and developed algorithms. A programme has been developed for studying and evaluating the operation of the new method, which significantly facilitates this process.