Riga Technical University
Institute of Energy Systems and Environment
Vilnius Gediminas Technical University
Department of Environmental Protection and Water Engineering

Methodological guidelines for the development and defense of the final thesis

in the academic Master's double degree study programs "Environmental Engineering" and "Environmental Engineering and Management"

"Methodological guidelines for the development and defense of the final thesis within in the academic Master's double degree study programs "Environmental Engineering" and "Environmental Engineering and Management".
Riga: RTU IESE: 2024, p. 6.

General Provisions

1. The methodological guidelines for the development and defense of final thesis within in the academic Master's double degree study programs "Environmental Engineering" and "Environmental Engineering and Management". are designed for students of the Master's level double degree study programs "Environmental Engineering" at the Faculty of Natural Sciences and Engineering of RTU (Riga Technical University) and "Environmental Engineering and Management" at the Faculty of Environmental Engineering of VGTU (Vilnius Gediminas Technical University), as well as for academic staff, thesis supervisors, reviewers and members of the Final Thesis evaluation committee.
2. The methodological guidelines for the development and defense of final thesis within in the academic Master's double degree study programs "Environmental Engineering" and "Environmental Engineering and Management" have been developed in accordance with the decision of the RTU Senate dated 30 September 2024 (Protocol No. 685) "Regulation on Final Examinations at Riga Technical University" (hereinafter referred to as the Regulations) and were approved by the Methodological Committee of the RTU Institute of Energy Systems and Environment (IESE) on 24 October 2024 (Protocol No. IESE-MK/2024-13) and by the RTU IESE and VGTU Department of Environmental Protection and Water Engineering meeting on 10 November 2024 (Protocol No.DDP_2024/2025-01).
3. The final thesis of academic Master study double degree program "Environmental Engineering" is a Master's thesis. The development and defense of the Master's thesis is a prerequisite for awarding the degree. The Master's thesis integrates the knowledge and skills obtained in the study program, conducting an in-depth study in a specific environmental engineering topic (corresponding to the thesis topic). The Master's thesis must include an introduction, literature review, main research section, conclusions and recommendations. The research section must include scientific research, such as laboratory or mathematical experiments, models and result analysis. Any bibliometric and/or bibliographical analysis of other authors' works is included in the literature review. The total volume of the Master's thesis is 30 ECTS.

Organization of Final Thesis Development

4. The development of the final thesis is guided and advised by academic staff member(s) appointed by the program director, who also provides overall oversight.
5. Final thesis topics are offered to students according to the study plan, specifically during the semester when the course "Master's Thesis" first appears in the curriculum. Topic selection is coordinated by the study program director, with the final topic and supervisor approved by the head of the responsible department.
6. The final thesis is developed in accordance with the study plan and a work schedule prepared jointly by the student and the thesis supervisor.
7. The progress of the final thesis development is monitored by the supervisor and, according to the schedules defined in the "Master's Thesis" courses in the ORTUS system, overseen by an academic staff member or committee appointed by the program director.
8. In the final semester of thesis development, a pre-defense is conducted according to the deadlines specified in the "Master's Thesis" courses in ORTUS. The pre-defense aims to evaluate the thesis progress and provide recommendations for improvement. During this stage, the student presents their work at the RTU Student Conference through an oral presentation.

Structure of the Final Thesis

9. The final thesis is a well-argued scientific work. It must present original results, carefully documented from primary and/or secondary sources. The thesis should include a significant research component and focus on a scientific field. It gives the student the opportunity to demonstrate knowledge in the chosen research area by combining theoretical knowledge, professional skills and competencies.
10. The structure of the final thesis should include:
    - Introduction: 3–5%
    - Literature Review: 25–30%
    - Main Research Section (methodology, results and discussion): 60–69%
    - Conclusions and Recommendations: 3–5%

11. The final thesis should contain the following sections:

<table>
<tr><th>RTU</th><th>VGTU</th></tr>
<tr><td>• Title page
• Signature Page
• Declaration of authorship
• Supervisor's task (completed by the scientific supervisor)
• Annotation in two languages (English, Latvian)</td><td>• Title page
• Signature Page
• Declaration of authorship
• Objectives for Master's Thesis
• Annotation in two languages (English, Lithuanian)</td></tr>
<tr><td colspan="2">• Table of contents
• List of figures
• List of tables
• Abbreviations
• Introduction
• Literature review
• Methodology (additional paragraph Environmental Impact Assessment)
• Results and discussion
• Conclusion and recommendations
• References
• List of author's publications (if applicable)
• List of author's presentations (if applicable)
• Appendices</td></tr>
</table>

12. Volume for the final Master's thesis, a minimum of 60 pages is required, counting from the "Introduction" page to the "Recommendations" page. However, the total length of the thesis should be sufficient to comprehensively address the specific topic and achieve its stated objectives.

Final Thesis Submission for Defense

13. The student must format the final thesis according to RTU IESE final thesis formatting guidelines.
14. The finalized thesis, coordinated with the supervisor(s) and the academic staff member(s) responsible for monitoring the thesis development, is uploaded by the student to the Register of graduate papers in the RTU ORTUS portal.
    - After uploading the final thesis in PDF format, the student confirms that the work was done independently and is free from plagiarism. Once uploaded, the thesis supervisor and, if necessary, other persons designated by the program director will be invited to approve the submission.
    - The readiness of thesis for submission is approved by the thesis supervisor in the Register of graduate papers.
    - The thesis is considered submitted for defense when in the Register of graduate papers it is approved by the supervisor and, if necessary, by other persons designated by the program director.
15. Before submission for review, the thesis is checked for plagiarism using RTU's unified computerized plagiarism control system.
16. The Student Support and Administrative Center or a person appointed by the study program director organizes the submission of the final thesis for review by the reviewer.
17. The reviewer for the final thesis is recommended by the study program director.
18. Once the final thesis is submitted to the reviewer, it can no longer be modified in the Register of graduate papers.
19. Before the defense of the final thesis, within the deadlines defined in the Regulations, the thesis supervisor submits feedback (see Appendix 1) and the reviewer submits the prepared review (see Appendix 2):
    - The supervisor's feedback should include a description of the student's independence and cross-disciplinary competence, the final thesis's compliance with the task, as well as an opinion on the thesis's alignment with the goals of the study program and a recommendation for granting the degree.
    - The review should include a general characterization of the thesis's volume and content – the relevance of the work, the novelty of the problem addressed, its alignment with the current scientific level in the relevant field, the positive aspects of the work and identified shortcomings.
20. The decision to allow the final thesis to be defended, taking into account the results of the plagiarism control system, the supervisor's feedback and the reviewer's review, is made by the RTU IESE Methodical Committee.

Final Thesis Defense and Evaluation

21. The final thesis defense takes place at an open Final Thesis Evaluation Committee meeting or in accordance with the procedures specified in the Regulations.
22. The final thesis can be submitted for defense if:

- The supervisor rates it at least grade “4”.
- The reviewer rates it at least grade “4”. If the reviewer gives a grade lower than 4 (almost average), a second reviewer must be assigned.

23. The student prepares the final thesis for defense:
    - A presentation in electronic format according to RTU IESE guidelines.
    - A video presentation according to RTU IESE guidelines.
24. The student presents the results of their final thesis, answering questions from the audience, the reviewer and the Final Thesis Committee members.
25. The proceedings of the Committee’s meeting, including the questions posed to the student, are recorded by the secretary, who is not a member of the Committee and does not have the right to evaluate.
26. The performance of the student is evaluated by the Committee in a closed session based on the quality of the student’s report and responses to questions, as well as taking into account the supervisor’s feedback and reviewer’s evaluation.
27. The final thesis is evaluated by the Committee using a 10-point grading scale. The lowest passing grade is 4 (almost average).
28. The final grade for the final thesis is calculated using the formula:

RTU	**VGTU**
$$V = 0{,}85 \cdot vid \sum V_i + 0{,}15 \cdot V_r$$ Where : • V is the final grade for the thesis, points. • V_i is the arithmetic mean of the Final Thesis Evaluation Committee members individual evaluations of the thesis content and defense (including answers to questions), points. • V_r is the reviewer’s evaluation of the final thesis, points. In the case of the RTU study program, the final thesis can be awarded the grade “10” if the student has submitted a scientific publication on the Master’s thesis topic or a research project proposal on the Master’s thesis topic.	$$V = 0{,}85 \cdot vid \sum V_i + 0{,}2 \cdot V_r$$ Where : • V is the final grade for the thesis, points. • V_i is the arithmetic mean of the Final Thesis Evaluation Committee members individual evaluations of the thesis content and defense (including answers to questions), points. • V_r is the reviewer’s evaluation of the final thesis, points. The final Master thesis score is equal to the arithmetic mean of all panel members' ratings. Each member of the commission evaluates Master thesis individually based on the reviewer's conclusion on BD and the supervisor's feedback.

Annex 1
Sample of the supervisor's feedback on the final thesis

Supervisor's feedback on the Bachelor's / Master's thesis

1. Author: _____

2. Title of the Bachelor's/Master's thesis: _____

3. Evaluation of the development and quality of the Bachelor's/Master's thesis:

Criteria	Evaluation (please mark the appropriate)				Comments
	Insufficient	Satisfactory	Good	Excellent	
Novelty of the thesis results					
Accuracy of the research goal and objectives					
Understanding and application of the methodology					
Use of research skills and knowledge					
Independence and initiative					
Problem-solving skills					
Progress in thesis development					

Conclusion on the Bachelor's/Master's thesis:

Recommended grade in points:

Scientific supervisor:

Annex 2
Sample of the final thesis review

REVIEW OF THE MASTER'S/ BACHELOR'S THESIS

1. Author:

2. Master's/ Bachelor's thesis title:

Formal requirements (10 % of final grade)			
Criteria	**Description of criteria**	**Remarks and comments**	**Evaluation (1-10)**
Structure of bachelor thesis (BT)/master theses (MT)	Compliance to requirements for BT/MT, provided information in section and subsections is consistent, unite and logic		
Text formatting and quality of information presentation	Compliance to guidelines, language errors, used terminology, etc.		
Demonstration of obtained general skills (10 % of final grade)			
Disclosure of topic and problem	Relevance of the topic, disclosure of the problem, formulation of aims and objectives and their execution, formulation of hypothesis		
Analysis of scientific literature (20 % of final grade)			
Relevance of literature sources	Relevance of the cited sources, their actuality, coverage of literature review, citation accuracy, number of literature sources (at least 25 scientific articles)		
Methodology of research (20 % of final grade)			
Applied methods and tools	Quality of methodology description, justification of its selection, compliance with aims and objectives of the work		

Performed research and data analysis (40 % of final grade)			
Research	Consistency of research, logic work flow, correct application of assumptions, generalized description, proper application of theoretical, experimental and software skills, etc.		
Analysis of results	Reliability of obtained results, description and presentation quality, scientific discussion		
Conclusions and recommendations	Formulation, validity, generalization		

ADDITIONAL GRADE (up to 1) **Scientific publications, participation in conferences*** *Attendance at a conference or seminar is evidenced by a publication, abstract, conference program.		
Number of scientific publications (number)		
Number of presentations in conferences (number)		
Other research activities related to BT/MT		

Questions of reviewer (2-3 questions)
Final evaluation:

(Scientific and academic titles, name and surname of reviewer)

(Institution)

Date: