UNIVERSITY OF RIJEKA'S GUIDELINES FOR COMPLETING AND EQUIPPING DOCTORAL THESES

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# INTRODUCTION

A doctoral thesis is an original scientific work that represents a new contribution to science. Due to its originality, a doctoral thesis is a scientific work worthy of publication. It is written independently by a doctoral candidate. A doctoral thesis must be a unique scientific work whose methodology and contribution to science in an adequate fashion determine the doctoral candidate's capabilities to perform independent scientific research in the scientific area and field in which the academic title *Doktor znanosti* (Ph.D.) is awarded.

A doctoral thesis must contain new scientific knowledge, scientific facts, scientific laws and legitimacies, scientific theories that contribute to the development of science and solving of current complex theoretical and practical problems that have never been explored or have not been adequately explored. In the processing of the selected and approved topic of the doctoral thesis, the doctoral candidate is obliged, based on the results of basic and applied research and by using scientific methods and scientifically based methodological procedures, to systematically formulate and publicly present the results of his/her research.

By conducting the research, obtaining research results, writing the text and defending the doctoral thesis, the doctoral candidate must prove that he/she is capable of working as an independent researcher in all kinds of scientific projects.

The forms of the doctoral thesis are the following:

1. A monograph (the traditional form)

2. A collection of published scientific papers with a clear introduction, a short elaboration of the paper, conclusion, and literature (the so-called Scandinavian model). This thesis form is only possible in the framework of research at the doctoral study, and scientific papers must be published after the enrollment into the doctoral study.

# COMPLETION OF THE DOCTORAL THESIS

Prior to completion of the doctoral thesis, i.e. during the application of the thesis topic, it is necessary to define the main elements and the main phases of the completion of the doctoral thesis, i.e. to take into consideration:

* The purpose and goal of the thesis,
* Thesis structure,
* Documentation basis (information base),
* Technical processing of the thesis.

## Purpose and Goal of the Doctoral Thesis

The primary purpose of the thesis is the doctoral candidate's contribution by new original results of the scientific research to the expansion of the treasury of new knowledge, contribution to the application of new knowledge in theory and practice, proving or refuting the set hypothesis (if any). The goal of the doctoral thesis is acquiring the highest academic degree of scientific training and development – the academic title *Doktor znanosti* (doctorate) in a specific scientific area and field.

This also implies other purposes and goals, such as:

* + Doctoral candidate's fuller, more profound and comprehensive understanding of the subject matter in a particular scientific area and field (or more);
	+ Full preparation of the doctoral candidate for independent scientific and research work;
	+ By acquiring the academic title *Doktor znanosti* (doctorate), the doctoral candidate will create a fundamental precondition for further affirmation in the world of science and higher education.

## Structure of the Doctoral Thesis

A doctoral thesis can be written in the Croatian or, with additional explanation, the English language, i.e. another language used in the discipline. Thesis title must be written in the source language as well as the Croatian and English language. The doctoral thesis has a certain structure, i.e. systematic arrangement and interconnection of all its parts.

A doctoral thesis in the form of a monograph usually includes the following elements:

* + **Text on the cover page** is written in bold (University of Rijeka, Faculty/Department, Name and surname of the author, Title of the doctoral thesis, Doctoral thesis, Rijeka, Year),
	+ **Text on the spine of the cover page** is written in bold (Name and surname of the author, Year and Title of the doctoral thesis. If the title is too long, it is shortened and followed by ellipsis),
	+ **The first page following the cover page is empty,**
	+ **The front of the second inner page** includes the same text as the cover page (the contents and language are the same as on the cover page including the list of supervisors),
	+ **The front of the third inner page** (unless the thesis is written in the English language) includes the same text as the front of the second inner page in the English language,
	+ **The front of the fourth inner page** includes information on the supervisor/co-supervisor (title, name and surname), information on the time and place of the doctoral thesis defence and information on the members of the committee before which the doctoral thesis has been defended (title, name and surname),
	+ **Acknowledgments** (optional),
	+ **Abstract** in the language of the thesis and the English language,
* **An expanded abstract** in the Croatian language only if the language of the thesis is not Croatian,
	+ **Keywords** in the language of the thesis, and in the Croatian and English language,
	+ **Table of contents,**
	+ **Introduction,**
	+ **Elaboration of the thesis,**
	+ **Conclusion,**
	+ **Bibliography,**
	+ **Illustrations**, i.e. a list of tables, graphs, pictures, photographs, drawings, schemata, diagrams, histograms, maps…,
	+ **Appendices** (if any)
	+ **Biography of the author, bibliography of published works included.**

A doctoral thesis written according to the so-called Scandinavian model usually includes the following elements:

* + **Text on the cover page** is written in bold (University of Rijeka, Faculty/Department, Name and surname of the author, Title of the doctoral thesis,Doctoral thesis, Rijeka, Year),
	+ **Text on the spine of the cover page** is written in bold (Name and surname of the author, Year and Title of the doctoral thesis. If the title is too long, it is shortened and written with an ellipsis),
	+ **The first page following the cover page is empty,**
	+ **The front of the second inner page** includes the same text as the cover page (the contents and language are the same as on the cover page including the list of supervisors),
	+ **The front of the third inner page** (unless the thesis is written in the English language) includes the same text as the front of the second inner page in the English language,
	+ **The front of the fourth inner page** includes information on the supervisor/co-supervisor (title, name and surname), information on the time and place of the doctoral thesis defence and information on the members of the committee before which the doctoral thesis has been defended (title, name and surname),
	+ **Acknowledgments** (optional),
	+ **Abstract** in the language of the thesis and the English language,
* **An expanded abstract** in the Croatian language only if the language of the thesis is not Croatian,
	+ **Keywords** in the language of the thesis, and in the Croatian and English language,
	+ **Table of contents,**
	+ **Introduction,**
	+ **Elaboration of the thesis according to the so-called Scandinavian model** is a critical overview of the results of the doctoral thesis placed in the context of current scientific insights, and it may not be shorter than 30 pages,
	+ **Conclusion,**
	+ **Bibliography,**
	+ **Illustrations**, i.e. a list of tables, graphs, pictures, photographs, drawings, schemata, diagrams, histograms, maps…,
	+ **Appendix – published scientific papers that make a substantial whole with the doctoral thesis.** The Appendix includes at least three scientific papers published in journals covered by Web of science or ERIH database, of which at least one in a journal with a larger impact factor than the median of the impact factor of the journal in the field of the doctoral research. Each paper, unless it includes a special elaboration, may provide qualification for only one doctoral candidate. The doctoral candidate must be the main author in at least two papers of the above-mentioned papers. The integrated papers must provide a new scientific contribution in relation to previous papers,
	+ **Biography of the author, bibliography of published works included.**

**The page with information on the supervisor/supervisors.** It is necessary to specify the title and the name of the supervisor (or supervisors) and members of the Committee for the defense of the doctoral thesis as well as the institution of employment.

**Abstract**. It is written in the language of the thesis and in the English language. The abstract includes the overview, i.e. very brief content of the entire thesis. It has a dual purpose: to serve the public as an information about the doctoral thesis and to enable the readers to quickly gain an insight in the important features of the doctoral thesis. The abstract should not exceed one standard page (1 standard page is equivalent to 1800 characters, including spaces) and must enable the readers to understand the goal of the thesis, research methods, results with important explanations and the author's conclusions. It should be written simply, in complete and connected sentences, using technical terms only where necessary to make the text understandable to the general public, and abbreviations should be avoided.

**Keywords** shall be in the language of the thesis as well as the English and Croatian language.

**An expanded abstract** is written in the Croatian language only if the dissertation is not written in Croatian. It should not exceed two A4 pages, and it contains the objectives, methods, results and conclusions of the research.

**Table of contents** is a numerical and textual overview ofchapters and subsections of the doctoral thesis by which it is easier to find the initial pages of chapters and subsections.

**Introduction** is the initial part of the doctoral thesis that provides an introduction to the thesis and thesis topic. In this part of the text, the doctoral candidate introduces the readers to the subject area, the problem and subject of the research, the set hypothesis (if any), the purpose and goals of the research, review of previous research, scientific methods and thesis structure. Introduction is written after the completion of the text of the doctoral thesis. Thus, the **introduction** of any doctoral thesis must include the following five elements: the problem and subject of research with a hypothesis (if any), purpose and goals of the research; a brief overview of current research; scientific methods; thesis structure (particular notes listed in the elaboration of the topic and working hypotheses of the doctoral thesis). Introduction should neither be too short nor too long.

**Text of the thesis**. The completed text of the doctoral thesis is systematically divided into parts (chapters) and subparts (subsections) according to the decimal system and according to previously prepared contents. The presentation of the entire subject matter of such a thesis is systematically classified into three groups:

* historical and theoretical, retrospective or explicative part, i.e. an overiew of previous research;
	+ analytical and experimental part;
	+ prospective part, i.e. discussion of the results.

These are not literally the three parts of the doctoral thesis, nor the titles of those parts. These are, in fact, three groups that can have multiple parts with familiar titles, and this especially referrs to the second, most important group: the analytical and experimental part. As a rule, this group includes several parts, because it solves the problem and subject of the research. This is the part in which the set hypothesis, i.e. working hypothesis and auxilliary hypotheses, if any, are proven or refuted.

The elaboration of the research subject in the doctoral thesis emphasises knowledge, ability, critical thinking, inventiveness, experience in scientific research and motivation of the doctoral candidate. He/she has to scientifically and logically link the relevant knowledge, facts, evidence and thoughts in identifying problems, judgments, definitions, laws, and theories, and in drawing conclusions. In this process, the doctoral candidate should be independent and impartial in judgment and make relevant assessments and proposals.

Each part of someone else's work in the thesis, regardless of whether presented in direct or indirect speech or interpreted (opinions, knowledge and formulations of other authors), must be cited and listed as a reference in the bibliography at the end of the thesis. Along with the quoted and paraphrased parts, the text must contain the author's last name or the original data source as well as the year of publication or a number of the aforementioned reference in square brackets. If the publication has two authors, both are cited, and if there are several authors, only the first one is cited in the text, followed by *et al*. By way of exception, in the event that something cannot be cited, the author can use notes at the bottom of the page ('footnotes'). As a rule, they should only contain the necessary additional explanations of the basic text. Uncited parts of someone else's works are considered plagiarism.

In tables, diagrams and other appendices that need to be numbered, data and sources are listed below.

**Conclusion** is a systematic, concise and brief synthesis of all relevant knowledge, information, opinions, scientific facts, theories and laws elaborated in more detail in the analytical part of the doctoral thesis, which are used to prove the set hypothesis (if any). The conclusion does not contain someone else's quotes and notes. Parts, i.e. fragments of the conclusion are not numbered, but rather formulated according to thesis structure. The conclusion should neither be too short nor too long; it should not exceed 10% of the total scope of the doctoral thesis (i.e. up to about twenty standard pages).

**Literature.** At the end of the thesis text, i.e. after the conclusion, there is a list of references (bibliography). The list contains all the works cited in the doctoral thesis. This means that the list should not contain uncited works, i.e. those not mentioned in the thesis.

When citing bibliographic information, the text should list the author's surname or the original data source and year of publication or a number of the aforementioned reference in square brackets. If the publication has two authors, both are mentioned, and if there are several authors, only the first one is mentioned in the text of the doctoral thesis, followed by *et al.*, while in the reference list, the surnames of all the authors should be listed with initials of the first name. References should be arranged alphabetically, with works by the same authors listed chronologically. An ordinal number in square brackets should be placed after each reference.

Data in the list of references are written for different sources (for magazines, conference proceedings, symposium proceedings, etc., for books, and book chapters) in different ways, and doctoral candidates apply them in accordance with the adopted standards prescribed by the Faculty/Department.

For example, if a book is cited, the following should be specified: surname and name (or initial of the name), title of the work, publisher, place, year of publication and page number. In case of a magazine, the list contains surname and name (or initial of the name), paper title, name of the magazine, number and annual file, year, place of publication and page number, etc.

Doctoral candidates should look up detailed instructions on citation and references in the relevant literature for a specific profession.

**Illustrations.** All illustrations (tables, graphs, pictures, photographs, drawings, schematas, diagrams, histograms, maps…) must have an appropriate caption and number as listed in the text, each group on a separate list (e.g. list of tables, list of pictures in the text…). Pictures and tables must be uniform, i.e. drawn and written in the same way, using identical standardised graphic symbols and marked by ordinal numbers. The explanation of symbols used in charts should be separately indicated in the legend.

Table caption should be placed above the table, and picture caption (graph, photograph, drawing, schemata, diagram, histogram, map…) below the picture, starting at the left margin. If the illustration is not an original contribution of the author, it is necessary to cite the source (if the illustration has been published), or the author (if the illustration has not been published yet) in the caption.

If the pictures, diagrams, tables, etc. exceed A4 format, they should be folded and arranged and, if necessary, placed in a special cover pocket as an attachment. In case of a large number of pictures, diagrams, tables, etc., they can be placed in the Appendix.

**Appendix.** If the thesis involves appendices (certain lists, detailed results of the analyses, photographic documentation, etc.), they should be placed at the end of the dissertation. They can be marked by letters (APPENDIX A, APPENDIX B…) or numbers (APPENDIX 1, APPENDIX 2…). Appendices are numbered in the order in which they are first mentioned in the text and placed at the end of the doctoral thesis.

The so-called Scandinavian doctoral thesis writing model includes at least three scientific papers published in journals covered by Web of science or ERIH database, of which at least one in a journal with a larger impact factor than the median of the impact factor of the journal in the field of doctoral research. Each paper, unless it includes a special elaboration, may provide qualification for only one doctoral candidate. The doctoral candidate must be the main author in at least two papers of the above-mentioned. The integrated papers must provide a new scientific contribution in relation to previous papers,

**Biography of the author with the list of published works.** The biography should be written in third person singular, and should not exceed 1800 characters, including spaces. After the biography there is an overview of the doctoral candidate's published works written in the same manner as bibliography in the doctoral thesis.

## Technical Processing of the Doctoral Thesis

Technical processing of the doctoral thesis implies:

• **Writing of the text of the doctoral thesis**

Writing of the text of the doctoral thesis starts after quality completion of all the research phases, i.e. after the identification of the scientific problem and its formulation; setting hypothesis (basic and auxilliary hypotheses, if any), topic analysis, preparation of a draft research plan, compilation of working bibliography; collecting, studying and arranging literary material; finalising the structure of the doctoral dissertation, and preparation of illustrations.

• **Language, style and terminology of the text**

In the treatment of language, style and terminology of the text, special attention should be devoted to:

* language as means of communication,
* writing style,
* basic features of language and style.

**Technical preparation of the text**

The text of the doctoral thesis should be gramatically and orthographically correct, free of typographic errors, printed out on a computer printer on the A4 format (21x29,7 cm). A page may contain a maximum of 1800-2200 characters and should not exceed 35 lines. It is recommended that chapter titles be written in upper case bolded characters, while chapter subsections should be written in lower case bolded characters. The text on each page should be logically divided into paragraphs. The text should be printed on a single sheet and pages should be numbered. Pages preceding the body of the thesis are marked with Roman numerals, and the thesis text with Arabic numerals. Pagination should cover every page from Introduction to the end of the work. Pagination is placed at right bottom of page. The dissertation is to be submitted bound.

**Page formatting:**

* Character type (font): obligatory use of all Croatian characters – Arial, Times New Roman, etc. are recommended
* Font size: 12 typographic points
* Line spacing: 1,5 lines
* Left and right margin: 2,5 cm
* Upper and lower margin: 2,5 cm

*The title page has different margins (presentation below)!*

**Cover page, spine and inner cover**

Cover page: University of Rijeka, faculty/department name, author's name and surname, title of the doctoral thesis, doctoral thesis, Rijeka, year of doctoral thesis defence. Cover page edges (margins) must be: 3 cm for the left, right, upper and lower margin with the font size of 16 typographic points.

Spine: author's name and surname (if too long, first name initials and surname are written), year of doctoral thesis defense and thesis title (if too long, it should be shortened and followed by ellipsis).

A graphical display of the pages preceding the textual part of the doctoral thesis is presented below.

Cover page and spine (in the language of the thesis)

 Name and surname of the author Year Thesis title

upper margin 3 cm

lower margin 3 cm

UNIVERSITY OF RIJEKA

FACULTY/DEPARTMENT NAME

 (font: Arial 16)

Candidate's name and surname

(font: Arial 16)

**TITLE OF THE PhD THESIS**

**(font: Arial 22, bold)**

DOCTORAL THESIS

(font: Arial 16)

Rijeka, year

(font: Arial 16)

left margin: 3 cm

right margin: 3 cm

Page 2 – the first inner page (the contents and language are the same as on the cover page, including names of the supervisors):

upper margin 3cm

lower margin 3 cm

UNIVERSITY OF RIJEKA

FACULTY/DEPARTMENT NAME

(font: Arial 16)

Candidate's name and surname

(font: Arial 16)

**TITLE OF THE PhD THESIS**

**(font: Arial 22, bold)**

DOCTORAL THESIS

(font: Arial 16)

Supervisor/supervisors: title, name and surname

Co-supervisors: title, name and surname

(font: Arial 16)

Rijeka, year

(font: Arial 16)

left margin: 3 cm

right margin: 3 cm

Page 3 – the second inner page (cover page in the English language, unless the thesis is written in the English language)

upper margin 3cm

lower margin 3 cm

UNIVERSITY OF RIJEKA

FACULTY/DEPARTMENT NAME

(font: Arial 16)

Candidate's name and surname

(font: Arial 16)

**TITLE OF THE PhD THESIS**

**(font: Arial 22, bold)**

DOCTORAL THESIS

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Rijeka, year

(font: Arial 16)

left margin 3 cm

right margin 3 cm

Page 4 – the third inner page

upper margin 3cm

lower margin 3 cm

Supervisor of the thesis: title, name and surname

The doctoral thesis has been defended on \_\_\_\_\_\_\_\_\_\_\_\_ in/at \_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, before the Committee of the following members:

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

margin 3 cm

 margin 3 cm

## The Scope of the Doctoral Thesis

There are no strict standards for the scope of the doctoral thesis. It is different in different scientific areas and fields. Generally, the scope should be about 200 standard pages (1 typed standard page = 2200 characters, including spaces). For the doctoral thesis written according to the so-called Scandinavian model, the scope of elaboration of the doctoral thesis presenting a critical overview of the results of the doctoral thesis may not be shorter than 30 pages.

## Recommendations for Simpler Uniform Text Formatting of the Doctoral Thesis

**Legibility and graphic symbols**

* **The form of the graphic symbols in pictures, tables and text** should be identical.
* **There shall be no English or other foreign words in the Croatian text**, except in cases when there is no Croatian word for the respective term; a characteristic foreign term can be used in this case, but in *italic* (cursive)*.*
* **In formulas** (when in text or written in separate lines), it is important to devote attention to the use of upper case and lower case letters, vertical and italic letters. The general rule is that the symbols for physical quantities should be internationally adopted. In addition to physical equations used for expressing physical phenomena and laws that govern various quantities, it is allowed to use the so-called number-and-unit relationships. The use of the International System of units (SI) is mandatory, as well as units of measurement that are legal in Croatia (The Measurement Units Act,Official Gazette No. 58/93).

The equations used should be numbered in parentheses in the right corner. The meaning of all symbols is explained immediately after the formula in which they had been used the first time.

* **Physical and other quantities are written in italic.** Numbers and units of measurement are written vertically as well as, generally, all exponents and indices, except upper and lower indices marking a quantity (i.e. counters in summing up according to quantities or indices marked *i*, *j*, …) – they are in that case written in italic.
* **Mathematical symbols, functions and operators** (+, =, ≠, ≥, sum Σ, ∫, lim, diferential d or ∂, element є, log, natural logarithm base e, ln, div, grad, Δ, sin, tan, etc.) are written vertically.

**Spelling and print uniformity**

To eliminate ambiguities when reading the text, the following writing rules should be followed:

* **In physical equations,** writing of the product of numerical value and the corresponding units is prescribed (both are written vertically).It is not recommended to separate the product at the end of the line (i.e. it is safe to say that the print at the end of the line is unbreakable!).Decimal multipliers (prefixes) next to a unit are written without spaces (kg = kilogramme, μm = micrometre, MW = megawatt, dag = decagramme, etc.), while the prescribed sign for marking the product of two units is multiplication sign with half-high dot or the so-called non-breaking space (instead of the multiplication sign, neither breaks at the end of the line).
* **It is recommended to write in the text**: pressure is measured in **millibars**, not in **mbar**; interest rate is expressed in **percentages,** not in **%**, etc. According to the Croatian spelling, the date is written 25 January 2004 or 25. 1. 2004. (not 25. 01.!).
* **Formulas**, especially when used in the text, should be written in a single line, and solidus „/“ should be used instead of fraction bar. The expression should not become ambiguous or polysemic. Decimal point is not a standardised European character; decimal comma should be written instead.

# SUBMITTING THE DOCTORAL THESIS FOR ASSESSMENT

When submitting the doctoral thesis for assessment, the candidate should prepare and submit a written application to the Faculty Council or another competent body at the Faculty/Department. The application shall be submitted on the prescribed forms of the University of Rijeka or the faculty/department.

The student shall submit to the faculty/department's secretary's office the bound doctoral thesis in 9 copies within 10 days before the defence. The secretary's office shall deliver a single copy of the doctoral thesis to the competent institutions in the Republic of Croatia. A single copy is submitted to the competent chair, supervisor, collection, the Dean, and the Faculty/Department library.

In addition to a bound printed copy of the doctoral thesis, an electronic version of the doctoral thesis is to be submitted to the libraries, in the format and on a medium prescribed by the Senate of the University of Rijeka, unless this is impossible due to reasonable grounds. (Rules on Publishing Activities of the University of Rijeka, University of Rijeka, Rijeka, 2013).

In order to efficiently meet the aforementioned obligation, the Senate has adopted the Guidelines on the format and medium of electronic publications that are to be stored into the Repository of the University of Rijeka.

# USEFUL INFORMATION SOURCES

* Zelenika, R.: *Metodologija i tehnologija izrade znanstvenog i stručnog djela*. University of Rijeka, Faculty of Economics, Rijeka, 1998
* *Pravilnik o studijima na Sveučilištu u Rijeci,* University of Rijeka, Rijeka, 2009
* *Statut Sveučilišta u Rijeci*. University of Rijeka, Rijeka, 2005
* *Zakon o znanstvenoj djelatnosti i visokom obrazovanju*. Official Gazzette No. 123/03, 105/04,174/04, 46/07, 45/09
* *Pravilnik o izdavačkoj djelatnosti Sveučilišta u Rijeci,* University of Rijeka, Rijeka, 2013