

**UNIVERSITY OF ZAGREB**  
**FACULTY OF SCIENCE**  
**Geology Department**

(In review)

**DOCTORAL STUDY IN GEOLOGY**

**Area of Natural Sciences**  
**Field of Geosciences**  
**Branches of Geology and Mineralogy**

**Zagreb, May 2006**

## 1. INTRODUCTION

### *1.1. Reasons for the proposal of the doctoral study in geology*

The proposer of the doctoral study in geology see the proposed study as a continuation of a long tradition of granted doctorates in geology at the University of Zagreb (since 1881 – Mijo Kišpatić, DSc, the first defended scientific doctorate at the University) and a successful postgraduate study that has continued since 1960 at the University of Zagreb, organized by the Faculty of Science.

- a) The purposefulness of the doctoral study in geology in Croatia is obvious having in mind that geology represents a basic discipline within natural sciences with considerable application in state economy. Geology is particularly important in the research and exploitation of energetic resources (especially oil and gas), and other natural materials (stone, sand, clay, ore minerals), as well as in water and environmental management. These aspects are inextricably linked to the national strategic priorities: environment, materials, resources and energy. Our knowledge on natural processes and materials makes the basis for technological progress.
- b) The development of knowledge-based society is primarily built on the insights we have in environmental processes, origin and characteristics of materials as well as on understanding of the composition and dynamics of the foundation of our existence – the Earth. Lecturers at the Geology Department make the most prominent research and teaching geological group in Croatia, which is reflected in the conducting of 9 projects of the Ministry of Science, Education and Sport, considerable international cooperations and the resulting scientific publications.
- c) The research cooperation has become very intense with all the relevant research groups in Croatia (at the Croatian Geological Survey, Ruđer Bošković Institute, Institute for Oceanography and Fishing, Croatian Hydrographic Institute, Faculty for Mining, Geology and Petroleum Engineering and other Faculties of the Universities of Zagreb, Split, Rijeka, Zadar ...), and with INA-

Naftaplin. Researchers in these institutions are also lecturers in the proposed doctoral study, and most of the researchers in the geology divisions within these institutions earned Master's and Doctor's degrees from this Faculty. Moreover, the international cooperation in research and teaching (especially the existing postgraduate study) has been achieved through a large number of technical projects.

- d) Contemporaneity of the proposed doctoral study is reflected in the similarity with programs of other universities. The proposed program is comparable to the programs of renowned universities in the European Union, in particular the ones in the area, that served as a benchmark when developing our own programs (University of Vienna [www.univie.ac.at/Geologie](http://www.univie.ac.at/Geologie), Charles University Prague, University of Padua <http://www.geol.unipd.it>).

### *1.2. Previous experience of proposers in realization of postgraduate doctoral studies and other postgraduate studies*

Geology Department at the Faculty of Science is a direct successor of the Mineralogy and Geology Program where the first scientific doctoral dissertation of the University of Zagreb was defended, and with 18 lecturers with academic titles in Geology, Geosciences, it is the most important research and lecturing geological group in Croatia. Geology Department has so far been conducting the postgraduate studies in geology. Until now, they have produced 106 doctors and 219 masters.

### *1.3. Openness of the study towards students' mobility*

As the previous study, the proposed study will continue to be open to graduates of the geology-oriented studies (conditioned by high grades) and exceptional graduates of related studies (with good foundation in natural sciences / geosciences) with the provision that they take extra courses and in pursuance of the approval by the Study Council.

The proposed program ensures transfer of ECTS credit points from geological and related doctoral studies at other universities.

### *1.4. Possibility of fully or partly shared study programs with universities abroad*

Prominent lecturers from numerous European countries (Slovenia, Italy, Hungary, Austria, UK, France, and Germany) and from the USA expressed their willingness to participate in the doctoral study in geology. Therefore, various possibilities of creating shared programs as well as of financial support are now being considered within the CEEPUS project.

## **2. GENERAL TERMS**

### *2.1. The name of the study*

Doctoral Study in Geology (Area of Natural Sciences, Field of Geosciences, Branches of Geology and Mineralogy).

### *2.2. The holder of the study and fellow institution in establishing and executing of the doctoral program:*

The holder of the study is the University of Zagreb, Faculty of Science and the organizer of the study is the Geology Department at the Faculty of Science. Lecturers from various institutions (Croatian Geological Survey – HGI, Ruđer Bošković Institute – IRB, Faculty of Mining, Geology and Petroleum Engineering – RGNF) are included in the program.

### *2.3. Institutional strategy on doctoral program development*

Scientific research programs and projects of the Ministry of Science, Education and Sport that are the basis for the doctoral study in geology are largely held at the Faculty of Science along with cooperating institutions (Croatian Geological Institute – HGI, Ruđer Bošković Institute – IRB, Croatian Hydrographic Institute – HHI, Institute of Oceanography and Fisheries – IOR) as well as at other faculties and universities in Croatia. At the same time, the Faculty of Science is the holder of the study being the basic institution of higher education that organizes lectures for all natural science disciplines.

### *2.4. Innovativeness of the doctoral program*

Geology as a natural science discipline immanently has interdisciplinary ties with other disciplines (and vice versa) in two aspects. The first aspect of the relationship is related to the connection with other natural science disciplines, while

the second is the application of geology in technical sciences (engineering), especially in construction, mining, geotechnology and hydrology. Moreover, geology interconnects and complements the environmental protection and management.

*2.5. and 2.6. Conditions of enrolment in the study, in particular conditions for attendants with previous qualifications under the pre-2005 system, and criteria and procedures of the selection of applicants*

Applicants with a diploma degree in geology have the right to enroll in the doctoral study in geology. The ones with unrelated degrees may enroll on the conditions that ask for additional courses in pursuance of the decision of the Doctoral Study Council. Applicants for the doctoral study have to have the average grade in the undergraduate study equal to or higher than 4.0. If the average grade is lower than 4.0 and higher than 3.50 the applicant has to enclose two relevant recommendations (of which one by the mentor). The applications for the enrolment in the doctoral study are reviewed by the Doctoral Study Council and then approved by the Geology Department Council.

So far the postgraduate study in geology has offered the possibility of earning either Master's or Doctor's degree. Thus, in the transitional period (until the first Masters are produced under the Bologna Process) the doctoral studies will accept graduate students with a degree from a four-year geology study whose average grade equals or is higher than 4.0. Graduate students with a degree from a related four-year study with the above mentioned average will enroll by Doctoral Study Council's special decision on condition that they take additional courses.

*2.7. Competency achieved upon completing the studies*

Having completed the doctoral study in geology, the doctor in natural sciences, in the field of geosciences, branches of geology and mineralogy, will be competent to carry out modern scientific research in the area of geology (geosciences).

A wider methodological preparation (understanding of the scientific method, personal practical experience in scientific research and publishing) provides the

postgraduate students with a valuable knowledge for work in business, environmental management, higher education and public administration.

### **3. PROGRAM DESCRIPTION**

#### *3.1. The structure and organization of the doctoral program. Full-time and part-time organization.*

The doctoral program in geology comprises of two components: teaching and research under the supervision of mentors. It is structured in a manner that the emphasis of the first (and partly the second) year of the study lies on the teaching material and in later years it is on the scientific research, which eventually results in the doctoral dissertation.

In order to complete the doctoral study, each student needs to collect 180 ECTS credit points, has to publicly defend his/her doctoral thesis and prior to the defense of the dissertation has to have at least one work published in a scientific journal with international review as the main author, and in the end they have to defend the doctoral dissertation.

In the first year of the study the student, candidate for a doctor's degree, in agreement with the study counselor registers for courses totaling 60 ECTS credit points that are connected to the topic of the future doctoral dissertation. Among the chosen courses there must be Methods of the Scientific Work, at least one basic subject and Seminar I. Besides the geological courses, there might be courses from other postgraduate studies, i.e. according to the need, courses from other undergraduate studies as well. To choose those courses one has to have a special permission of both the supervisor of the postgraduate study in geology and the supervisors of those other studies. During the first year of the study the student is obliged to hold Seminar I in presence of all the students of the doctoral study. The seminar is a written and publicly presented outline of a current scientific problem, based partially on secondary literature (book, review, article), and partially on primary literature. The topic of the seminar and the three-member committee are chosen by the Doctoral Study Council at the proposal of the Study Supervisor. If the student does not pass the seminar they can not proceed with the subject.

Course lecturers direct the student. Course lecturer grades the overall success in the course based on both the student's success in all aspects of the work and his/her test grade.



If the opportunity for additional quality lectures arises (e.g. visiting professor), the Study Supervisor can, with the consent of the Study Council, determine subsequent enrolment and compulsory attendance of one or two courses in any year of the study.

During the second and the third year the student, candidate for a doctor's degree, is included in the research of the chosen research laboratory and in the scientific subject matter of the mentor appointed by the Doctoral Study Council following the suggestion of the professional committee at the defense of the doctoral thesis.

During the second and third year and before the defense of their doctoral dissertation, the students, candidates for doctor's degrees, have to earn 120 ECTS credit points as follows:

- 40 credit points for the writing of the doctoral dissertation
- up to 40 ECTS credit points for being the author or co-author of a published work (in a journal with international review 20 ECTS credit points and in a WoS scientific journal 40 credit points);
- 20 ECTS credit points for two public seminars in mentor's research laboratory in the presence of at least 75% students-candidates enrolled in the same year and the three-member committee appointed by the Doctoral Study Council following the mentor's proposal. One seminar during the third year of the study is from a broad field (Seminar II), and the other is the public defense of the doctoral thesis proposal (Seminar III). Seminar III can be given in the second or the third year of study. The seminar topics are determined by the Doctoral Study Council following the study counselor's suggestion.
- up to 40 ECTS credit points by enrolling and passing optional courses.

The same rules apply to part-time students and full-time students (junior researcher). Moreover, when applying for the doctoral study they have to enclose the consent of the potential study counselor or mentor and his/her institution where the doctoral dissertation is planned.

*3.2. The list of compulsory and optional courses with the number of teaching hours required for their fulfillment and the respective ECTS credit points.*

Course code	Lecturer	Course	Hours teaching / exercises	ECTS credit points
<b>Basic courses</b>				
5800	Babić, Lj.	Sedimentology and Evolution of Basins related to Convergent Margins	15 + 30	9
5801	Marjanac, T. and visiting professor	Geological Aspects of Karst	15 + 0	4
5802	Bajraktarević, Z.	Biostratigraphy of Paratethys	15 + 0	4
5805	Juračić, M.	Environmental Geology	15 + 0	4
5806	Balen, D.	Mineral Equilibria in Magmatic and Metamorphic Processes	30 + 15	9
5807	Marjanac, T.	Geological Interpretation of Seismic Profiles	15 + 15	6
5808	Palinkaš, L.	Isotope Geology	30 + 15	9
5809	Balen, D.	Magmatism, Metamorphism and Geodynamic Processes	30 + 0	8
5810	Tomljenović, B.	Selected Topics on Structural Geology	15 + 0	4
5811	Prohić, E.	Interpretation and Mathematical Methods of Geological Data Analyses	30 + 15	9
5812	Sremac, J. Ćosović, V.	Methods of Investigation in Palaeontology	30 + 15	9
5813	Tibljaš, D. Trojko, R.	X-ray and Thermal Methods of Phase Analysis	15 + 15	6
5814	Tibljaš, D. Bermanec, V.	Spectroscopic Methods of Mineral and Rock Analysis	30 + 15	9
5815	Zupanič, J.	Sedimentary Petrology, Selected Topics	15 + 15	6
5816	Jelaska, S.	Methodology of Scientific Research	15 + 15	6
5817		Seminar I		5
5818		Seminar II		10
5819		Seminar III (public defense of the doctoral thesis)		10
<b>Specific courses</b>				
5900	Alajbeg, A.	Organic Geochemistry	15 + 15	6
5901	Babić, Lj.	Coastal Zone Management: Geoscientific Aspects	15 + 15	6
5902	Ćosović, V. Bajraktarević, Z.	Benthic Foraminifera as a Tool for Paleoenvironmental interpretation of the Paleogene and Neogene Sediments	30 + 15	9
5904	Bermanec, V.	Quantitative Optical Determinations	15 + 15	6
5905	Bermanec, V.	Mineralogy and Geochemistry of Rare Earth Elements	15 + 0	4
5906	Bermanec, V.	Selected Chapters of System of Mineralogy	15 + 15	6
5907	Biondić, B. Kapelj, S.	Hydrogeology and Water Protection in Karst	15 + 15	6
5908	Gušić, I. Cvetko Tešović, B.	Biotas, Paleo-Ecology and Biostratigraphy of Mesozoic Carbonate Platforms	15 + 15	6
5909	Cvetko Tešović, B. Bucković, D.	Carbonate Platforms	15 + 0	4
5910	Marjanac, T. Bucković, D.	Sequence Stratigraphy	30 + 15	9
5911	Juračić, M.	Selected Topics in Marine Geology	30 + 15	9
5912	Juračić, M.	Recent Sedimentation in the Sea	15 + 15	6
5913	Kniewald, G.	Thermodynamics in Mineralogy and Geochemistry	15 + 15	6

5914	Luić, M. Kojić-Prodić, B.	X-ray structure analyses	30 + 15	9
5915	Marjanac, T.	Geological Interpretation of Petrophysical Well Data	15 + 15	6
5916	Palinkaš, L.	Geochemistry of Igneous and Metamorphic Rocks	15 + 15	6
5917	Palinkaš, L.	Mineral Deposits	30 + 15	9
5918	Marjanac, T.	Quaternary Geology	15 + 0	4
5919	Pavelić, D.	Evolution of the Pannonian Basin	15 + 0	4
5920	Tomljenović, B. Herak, M.	Seismotectonics	30 + 15	9
5921	Prohić, E.	Selected Topics on Sediment Geochemistry	15 + 15	6
5922	Prohić, E.	Environmental Geochemistry	30 + 15	9
5923	Sremac, J.	Fossil Communities of the Late Palaeozoic – Palaeoecological and Biostratigraphical insights	15 + 15	6
5924	Šćavničar, S.	Structural Crystallography	15 + 0	4
5925	Šćavničar, S.	Raw Material for Ceramics - Composition of Products	15 + 15	6
5926	Bermanec, V.	Monocrystal Study by Combination of Analytical Methods	15 + 30	7
5927	Tonejc, A.	Electronic Diffraction and Microscopy	15 + 15	6
5928	Palinkaš, L. Horvatinčić, N.	Geochronology	30 + 15	9
5929	Sondi, I.	Physical Chemistry of Pollution Process	15 + 0	4
5930	Sondi, I.	Biom mineralization	15 + 0	4
5931	Ćosović, V.	Environmental Micropaleontology	15 + 0	4
5932	Moro, A.	Facies and Macrofossils of the Upper Cretaceous Carbonate Platform	15 + 0	4
5933	Grgasović, T.	Carbonaceous Algae in Sedimentology and Stratigraphy	30+15	9

### 3.3. Compulsory and optional activities and criteria for ECTS credit point allocation

Compulsory activities consist of carrying out research resulting in the writing of the doctoral dissertation, giving seminars, and passing exams in the required number of subjects. Students can obtain a part of the needed ECTS credit points through optional activities such as participation in scientific meetings (one poster earns up to 3 credit points, one oral presentation up to 4 credit points), residence and research in other (foreign) research laboratories and groups, participation in summer schools (workshops) – 4 credit points, assistance in undergraduate and graduate lecturing (maximum 6 hours a week – 60 hours of assistance earn 5 ECTS credit points). The allocation of credit points is carried out by the committee that follows the candidate's performance and it consists of the study counselor, mentor and another lecturer.

### 3.4. Description of each course and/or module:

## CURRICULA

Notice: Curricula are in the other document:

[http://geol.gfz.hr/poslijediplomski/GEOLOGY\\_Curricula.pdf](http://geol.gfz.hr/poslijediplomski/GEOLOGY_Curricula.pdf)

*3.5. The rhythm and students' obligations. Conditions for progress through the study, registering in the next semester or trimester, i.e. next study year and preconditions for each subject or subject group.*

The applicants for the doctoral study who meet the enrolment requirements and have permission, register the first year of the doctoral study as a whole, in principle by October 1, of the current academic year.

In the first year of the study, student, candidate for a doctor's degree, in agreement with the study counselor registers for courses totaling 60 ECTS credit points that are connected to the topic of the future doctoral thesis. Among the chosen subjects there must be Methodics of the Scientific Work, at least one basic course and Seminar I. The Study Counselor registers as the holder of Seminar I. There are no prerequired courses except for students who did not hold major in geology. Those students have to pass the required undergraduate courses before taking tests in doctoral study courses.

Besides the geological courses, there might be courses from other postgraduate studies, i.e. if needed, courses from other undergraduate studies as well. To register for those courses one has to have a special permission of both the mentor of the postgraduate study in geosciences and mentors of those other studies. During the first year of the study the student is obliged to hold Seminar I in the presence of all the students of the doctoral study. The seminar is a written and publicly presented outline of a current scientific problem, based partially on secondary literature (book, review, article), and partially on primary literature. The topic of the seminar and the three-member committee is chosen by the Doctoral Study Council following the proposal of the mentor. If the student does not pass the seminar he/she can not proceed with the subject.

Student has to register a year as completed. All attended courses and tutorials need to be signed by the lecturer. All unattended courses are stamped „Not accomplished“.

To register for the second year it is necessary to pass the exams in subjects bearing at least 30 credit points, including the compulsory Seminar I. Seminar II, Doctoral thesis and courses from the first year that were not held are then entered.

To register for the third year all courses from the first year need to be accomplished and Seminar III has to be registered (if it was not registered in the second year).

Students of the doctoral program register for all but degree years (maximum three) after they have registered the third year as completed. When registering for an ABD year the Head of the Department has to be handed a short report on the work with the mentor's commentary.

In order to complete the doctoral study, each student has to have collected 180 ECTS credit points, has to publicly defend his/her doctoral thesis proposal before the defense of the doctoral dissertation, has to be the main author of at least one scientific paper published in a journal with an international review (accepted), and finally defend the doctoral dissertation.

*3.6. System of counseling and leading through the study, student selection method, obligations of study counselors and doctoral dissertation mentors, as well as of candidates for the doctor's degree.*

When enrolling each student is assigned a study counselor that is chosen by the Doctoral Study Council, the advisory body of the Geology Department Council. It also chooses the committee consisting of a counselor, a mentor and another lecturer at the doctoral study which then monitors the student's performance and the earning of the ECTS credit points. Doctoral Study Council has seven members from the doctoral study teaching staff that are chosen by the Department Council, except for the Study Supervisor and the Deputy Study Supervisor who are members by virtue of their office.

When registering the doctoral thesis the student is assigned a mentor who takes over the obligations of the study counselor. Mentor's main task is to help the student with advice and working conditions to produce the doctoral dissertation. They

share the responsibility for the student's progress, their inclusion in the scientific research and scientific improvement. If a mentor does not have an academic title, but has a title of a junior researcher (or higher), or is not from the Department of Geology at the Faculty of Science, a reporting co-mentor fulfilling that requirement will be assigned. A mentor has to be scientifically active in the area of the student's future thesis, which has to be proven by scientific work published in the last five years. Mentors are appointed by the Department Council following the suggestion of the student and the committee before which the doctoral thesis is to be defended. Mentor has to consent to the appointment.

Study Supervisor and Deputy Study Supervisor as well as the lecturers at the study are chosen by the Department Council at the Study Council's proposal. Study Supervisor is in charge of the smooth operation of the study as a whole, they suggest to the Head the solutions to current operational problems, and they chair the Study Council sessions. The Deputy takes over the Study Supervisor's obligation when they are unable or upon an „ad hoc authorization“. Only a person with an academic title in science (assistant professor or research fellow) can be appointed study official, lecturer, Study Counselor or Mentor.

Applicants with a degree in geology have the right to enroll in the doctoral study in geology. The ones with related degrees (biology, geography, geology-geography, geophysics, chemistry etc.) may enroll in the first year of the study provided that they accomplish additional undergraduate courses in geology, amounting to a maximum of 30 ECTS credit points according to the Department Council's decision. The additional courses are not included in the 60 ECTS credit points that the students of the first year register, but in the ones registered in the second and third year. The applications for enrolment are reviewed by the Doctoral Study Council and approved by the Department Council.

Applicants for the doctoral study have to have the average grade at the undergraduate study of at least 4.0 or 3.5 with two relevant recommendations (of which one has to be by the mentor).

*3.7. The list of courses and/or modules that students can choose from other postgraduate doctoral and specialist study programs.*

Besides the courses in the Doctoral Study in Geology, students can take courses in other doctoral studies, i.e. if needed from other undergraduate studies in accordance with the statutes of the University and the Faculty of Science. Those courses can amount to a maximum of 15 ECTS credit points in the first year of the study. In order to register those subjects, consents by the Supervisor of the Doctoral Study in Geology and the other studies are needed.

*3.8. The list of courses and/or modules that can be held in a foreign language (stating the language).*

In case there is interest (over 50% of all students), all listed courses can be held in English.

*3.9. Criteria and conditions of transfer of ECTS credit points – allocating the credit points to subjects that can be chosen from other studies at the University – to the proposer or other Universities.*

Students that register courses from other doctoral studies are in principle granted the ECTS credit points that are given to those courses at their original studies.

*3.10. Concluding the study and conditions for registering for the doctoral thesis. Procedure and conditions for the acceptance of the doctoral thesis. Procedure and conditions for the grading of the doctoral dissertation. Conditions and ways of defending the doctoral dissertation.*

To complete the doctoral study, each student has to have 180 ECTS credit points, has to publicly defend their doctoral thesis, prior to the defense has to have at least one work published in a journal with international review as the main author (accepted), and in the end has to defend his/her doctoral dissertation.

During the second or third year the applicant publicly explains and defends the thesis of the suggested doctoral dissertation („thesis acceptability test“), which has been made in accordance with the instruction under 3.15. At least 14 days prior to the thesis defense the applicant has to present the elaborated proposal of the

doctoral thesis to the public (in the Department office). The applicant presents the aim of the work and the expected scientific contribution. The three-member committee, which is appointed by the Study Council following the proposal of the Study Supervisor, judges the real contribution of the work and its possibilities according to the requirements for a doctoral dissertation. Special attention is paid to the methodological part and the testing of the candidate on research methods that he/she intends to use. The possibility of completion in the given time frame is also assessed. The Committee issues a written report of the checking. If the judgment is positive, the thesis is approved by the Department Council and then forwarded through the Faculty of Science Council to the Senate for approval. In case of a positive decision the applicant can proceed with the production of the doctoral dissertation.

The student can hand in the doctoral dissertation for grading having previously passed all the exams and defended the seminars, i.e. collected 140 ECTS credit points, and had written as the main author a work published (accepted) in a magazine with an international review. The dissertation is graded by the committee with an odd number of members (three or five) appointed by the Department Council, provided that at least one of the members be from outside the Faculty of Science and proposed by the Doctoral Study Council. Members of the Committee can be lecturers and scientists with the title of assistant professor, research fellow or higher. Candidate's mentor can not be the Chairperson of the Committee. The committee grade the dissertation, bearing in mind that a doctoral dissertation has to contain original scientific contribution, which in their opinion corresponds to at least three scientific papers in journals with international review, of which at least one in a scientific journals from the WoS list. Moreover, the thesis has to prove the student's knowledge of the modern scientific problem areas in the area of the thesis, his/her knowledge of theoretical principles and methods used, and in the end their ability to present his/her ideas, results and knowledge in a coherent and legible text on his/her own. The written committee report is submitted to the Department Council for adoption.

The candidate then binds the doctoral dissertation after it has been adopted and before its defense.

The student can defend his/her doctoral dissertation before the end of the third study year on condition that he/she has met all the requirements, collected the



prescribed number of ECTS credit points, published at least one article in a journal with international review as the main author, and if his/her written application has been approved by the Department Council.

Doctoral dissertation is publicly defended, before a committee with an odd number of members (three or five) that has been appointed by the Department Council following the same principles as for the Doctoral Committee, except that one deputy has to be appointed as well. Candidate's mentor can not be the chairperson of the committee. The defense consists of the candidate's uninterrupted presentation that can last up to 60 minutes, of his/her responses to the committee members' questions and of his/her responses to the questions from the audience.

A majority of committee member votes is needed for the candidate to defend his/her doctoral dissertation, and the committee has to publicly announce its decision.

A record has to be kept on the defense of the doctoral dissertation and later signed by all the members of the committee. Candidate's curriculum vitae, dissertation's summary and a list of published work are enclosed to the record.

The diploma of a doctor of science is issued by the University, and is presented by the Head of University at a graduation ceremony.

*3.11. Conditions under which students who discontinued the study or were stripped of their right of attendance in one study program can proceed with the study.*

Students can continue their education, in accordance with regulation 3.10. and 3.14., where they interrupted it unless they were stripped of their rights of attendance in the way predicted by the University Statute.

*3.12. Conditions under which a student is entitled to a certificate of all-but-degree status, as a part of the life-long education.*

If the student reaches the all-but-degree stage of the doctoral study, he/she can be issued a certificate on taken and passed courses and undertaken professional scientific activities. The text and layout, as well as the fee for such a certificate have to be coordinated at the level of the Faculty of Science and the University.

*3.13. Conditions and way of obtaining the degree of a doctor of science by enrolling in the doctoral study without attending courses and passing exams.*

Obtaining the degree of a doctor of science by enrolling in the doctoral study without attending courses and passing exams can be granted to persons who have published works in the area of geology as main authors bearing at least 140 ECTS credit points (an article in a journal with international review brings up to 20 ECTS credit points and in a WoS journal up to 40 ECTS credit points), and after two compulsory public seminars in front of a three-member committee in accordance with regulation 3.1.

*3.14. The maximum time elapsed between the beginning and the completion of the study (recommended four years for full-time students and seven for part-time students for a doctoral degree).*

Students have their student's rights during the first six years of study (three study years and three at ABD stage). If there are legitimate and documented reasons and if the student requests it, the department council can exceptionally extend the student's rights to two more academic years. Should the student fail to earn his/her degree of science in that time, he/she will be issued a certificate on taken and passed courses and undertaken professional scientific activities.

*3.15. Appendix: Instruction on the registration of the doctoral thesis*

TITLE

1. Proposition summary

(5-6 lines)

2. Geological situation

Geological description of the area in which the phenomena for research are located. The description may include geotectonic situation, tectonic structure, petrographic origin, dating, stratigraphy, the place in the development of the area and such, with referral to characteristics that are in close connection with the proposal.

(30-50 lines)

### 3. Research

Geographical location of the area or site with the objects of research.

### 4. Previous knowledge of the subject

What is already known on the scientific problem/topic? List the basic notions. What remained unknown, vague or dubious and is worth exploring? This is not a historical overview, but an overview of notions on the research problem area.

(approximately 40 lines)

### 5. Methods

Which research methods and analytical techniques are to be used? Describe and explain which method/technique will be used on which phenomenon, which characteristics will be determined /viewed and with what intention?

(25-50 lines)

### 6. Aim of the research and expected results

Which specific scientific problems will be solved? What will be clarified, explained, learned? How will the scientific knowledge expand and in what way will it be useful for future research?

(20-30 lines)

### 7. Bibliography

### 8. Other data

If the suggested research is a part of another scientific project, state the capacity in which you are involved (junior researcher etc.). State the title and the number of the project, the name of the principal researcher with his/her address, telephone and fax numbers, and the name of the institution where the project is being done. In which institution/institutions will the proposed research take place and why (equipment, scientists etc.)?

List the scientists (with the title of assistant professor, research fellow or higher) with whom you have analyzed or/and drafted the proposal. With whom, as possible mentor or mentors, have you analyzed or/and drafted the proposal?

The proposal is supplemented with the proposer' curriculum vitae and his/her list of published articles which can include articles with a confirmation of acceptance for publication.

Annotations:

The proposal needs to convince that the doctoral dissertation will contain original scientific contribution, which will roughly correspond to three scientific papers in journals with international review of which at least to one in a magazine from WoS.

Chapters 2, 4, 5 and 6 are documented by quoting the published material, which the proposer had to study in order to approach the proposed research. The majority of references in chapter 2 (Geological situation) pertain to papers presenting various data on the examined area and the wider region or zone. In chapters 4 and 6, the majority of references relate to scientific papers in reputable publications, which bring forth basic scientific knowledge, while a minority of the cited papers can include teaching text-books and review articles, and scientific papers which carry basic knowledge on the problem/thesis in connection with the research and wider region.

Sign the proposal. The proposal is co-signed („In agreement with the proposal“) by the Study Counselor and the principal researcher of the project if his/her participation is envisaged.

## 4. CONDITIONS OF THE STUDY REALIZATION

### 4.1. Locations of the study program

Study program will take place on the premises of the Geology Department of the Faculty of Science in Horvatovac Street, Zagreb. A part of the program, laboratory or experimental work in particular, will be achieved in cooperation with other departments of the Faculty of Science, Faculty of Mining, Geology and Petroleum Engineering and other faculties of the University, as well as with related fellow institutions (Croatian Geological Survey, Ruđer Bošković Institute etc.). Furthermore, an important part of the teaching will be held in the field within field research work.

### 4.2. Data on the premises and equipment envisaged for the study, especially the data on the research resources (research equipment, human resources).

The Geology Department of the Faculty of Science consists of two Institutes (Institute of Mineralogy and Petrography and Institute of Geology and Paleontology). Both institutes are located in Horvatovac Street. Within the institutes there are seven lecture-rooms fitted with presentation equipment (multimedia projectors, over-head projectors, slide projectors, video and TV sets). The lecture-room predicted for courses that include using microscopes is equipped with a dozen polarization microscopes, and for the teaching purposes there are a dozen stereomicroscopes. The Department has two water research laboratories (for preparation of samples for various analyses, sifting, water sanding) equipped with saws and sanding machines, mills and sets of standard sieves, centrifugal machine, sedigraph. Besides that, there are a chemical and X-ray laboratory (with a diffractometer for powder samples and XRF spectrometer), and a laboratory for electronic microscopy (SEM with EDS device). Some of them are locations for some of the lectures, i.e. research linked to the making of graded works.

Samples from the collection of fossils, minerals and rocks are intensively used in teaching. Students, researchers and lecturers have access to a library with over 13,500 listed units.

There are 14 computers available to either students' individual learning or lectures.

*4.3. The list of scientific and developmental projects on which the doctoral study is based.*

Recent projects financed by the Ministry of Science, Education and Sport

Project: 0119411

Esad Prohić, Ph.D, professor

The Role of Sampling Media in the Geochemical Investigations

Project: 0119412

Dražen Balen, Ph.D, professor

Crystalline Complexes of Sava-Drava Interfluve

Project: 0119420

Vladimir Bermanec, Ph.D, professor

Crystallochemistry and Other Properties of Inadequately Described Minerals

Project: 0119393

Ladislav Palinkaš, Ph.D, professor

Thermal Events in the Adriatic-Dinaric Carbonate Platform

Project: 0119403

Ljubomir Babić, Ph.D, professor

From Ancient Sedimentary Basins to Modern Sediments

Project: 0119400

Ivan Gušić, Ph.D, professor

The Role of Phanerozoic Carbonate Successions in the Structure of the Dinarides

Project: 0119402

Mladen Juračić, Ph.D, professor

## Sediments from the Adriatic Sea and Coastal Zone

Project: 0119401

Tihomir Marjanac, Ph.D, professor

Geological Effects of Bolide Impacts

Project: 0119404

Jasenka Sremac, Ph.D, professor

Croatian Paratethys - Taphonomi from Karpatian to Sarmatian

Besides the listed, there are approx. a dozen ongoing international projects gathering lecturers and collaborators that will participate in the doctoral study.

#### *4.4. Institutional management of the doctoral program.*

The bearer of the doctoral study in geology is the University of Zagreb, Faculty of Science, Geology Department in cooperation with fellow institutions.

The management of the proposed doctoral program is subsidiary. The holder of the program is the faculty of Science at the University of Zagreb. Organizational and financial control is at the level of the Geology Department of the Faculty of Science. The fundamental body that takes care of the study is the Council of the Doctoral Study in Geology. The council members are chosen among the teaching staff, and by the Council of the Geology Department of the Faculty of Science. The person responsible for the program management is the Supervisor of the doctoral study appointed by the Council of the Geological Department.

*4.5. Contractual relations between the student and the holder of the doctoral study, i.e. fellow institutions: for obtaining ECTS credit points, carrying out research work, defending doctoral dissertation, undertaking compulsory and optional activities.*

They will be regulated during the year.

*4.6. Names of lecturers and collaborators that will participate in the courses at the beginning of the study. Data on each engaged teachers.*

### **Professors, readers and senior lecturers**

Babić, Ljubomir (professor, GPZ)  
Bajraktarević, Zlatan (professor, GPZ)  
Balen, Dražen (assistant professor, MPZ)  
Bermanec, Vladimir (professor, MPZ)  
Bucković, Damir (assistant professor, GPZ)  
Cvetko Tešović, Blanka (senior lecturer, GPZ)  
Ćosović, Vlasta (associate professor, GPZ)  
Gušić, Ivan (professor, GPZ)  
Juračić, Mladen (professor, GPZ)  
Marjanac, Tihomir (associate professor, GPZ)  
Moro, Alan (assistant professor, GPZ)  
Palinkaš, Ladislav (professor, MPZ)  
Prohić, Esad (professor, MPZ)  
Sremac, Jasenka (associate professor, GPZ)  
Tibljaš, Darko (associate professor, MPZ)  
Zupanič, Jožica (professor, MPZ)

### **Honorary professors**

Alajbeg, Andja (honorary associate professor)  
Kniewald, Goran (honorary professor)

### **Professor emeritus**

Stjepan Ščavničar

### **Visiting professors**

Biondić, Božidar



Grgasović, Tonći  
Herak, Marijan  
Horvatinčić, Nada  
Jelaska, Sibila  
Kapelj, Sanja  
Kojić-Prodić, Biserka  
Kovačić, Marijan  
Luić, Marija  
Pavelić, Davor  
Sondi, Ivan  
Tomljenović, Bruno  
Tonejc, Anđelka  
Trojko, Rudolf

*4.7. The list of teaching premises for the realization of the study (teaching and research), consent of the supervisor of the teaching premises for workshops, statement on the existence of the required equipment and space for the workshops in accordance with the study program, and the list and qualifications of the collaborators that will participate (teach and hold workshops)*

All teaching except field research work will be carried out within the Faculty of Science and/or the University of Zagreb. Fieldwork will be done according to the curricula. Fieldwork will also be done in collaboration with the Croatian Geological Survey. Laboratory research work will largely be carried out within the University and partially in fellow organizations (public institutes – HGI, IRB, IOR, HHI).

*4.8. Optimal number of students that can be enrolled in terms of space, equipment and number of lecturers, especially with respect to the number of potential mentors.*

Optimal number of students that can be enrolled in the doctoral study with respect to the available material and human resources and the scientific fieldwork is up to 10 students per year.

*4.9. Estimated expenditures of the doctoral program and student fees.*

The average expenditure estimate is defined by the Geology Department Council every academic year.

*4.10. Financing of the doctoral program*

It is expected that the junior researchers scheduled by the Ministry of Science, Education and Sport will be financed by the Ministry. For part-time students (from abroad, for personal needs, employees of various companies) a price list will be determined in cooperation with the management of the Faculty of Science and the University of Zagreb.

*4.11. Quality of the doctoral program*

The program of the postgraduate study in geology, which was the basis for this proposal and program, was granted a work permit in 2002. In year 2004 a visitation and evaluation of the work of the Department was performed and our efforts in changing the program and the implementation of the changes were commended. In order to have a student feedback on quality control and course efficiency we plan to continue with student questionnaires. For such a system department councils have been established at the Faculty of Science.

Talks and interviews with graduate students are an important corrective for the program evaluation and its improvement.

Geology department has established a database on alumni which registers their further professional development, thus evaluating the past programs retroactively.

A preliminary version of this program (December 2005) has been forwarded for pre-review. Upon receiving positive results, the Senate of the University of Zagreb issued a guarantee and temporary permit for the Doctoral Study in Geology for the academic year 2005/2006.