

## Maritime Studies at Postgraduate Level in Croatia

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Postgraduate education is one of the most important of all the activities of universities as it is the basis for the research and development in all fields of science and technology on a local and global level as well as. Croatia has a long tradition in maritime higher education, highlighted by the Faculty of Maritime Studies of the University of Rijeka, that is the oldest maritime education and training institution of higher education in south-east Europe dating from the 19<sup>th</sup> century. Currently, the Faculty of Maritime Studies in Rijeka organizes the only active postgraduate study in maritime studies in Croatia. The postgraduate study is organized as an integrated interuniversity scientific study called “Maritime Studies”. The consortium of collaborating institutions is made up of three Croatian universities, two research institutes and the Croatian Navy. As the field of maritime studies is multidisciplinary in nature, the postgraduate study program comprises nine execution modules covering areas of nautical sciences, marine power and engineering systems, electronics and maritime communications, information technologies in maritime affairs and transport, logistics and management in maritime affairs and transport, hydro-graphic engineering, port systems, sea and coastal protection, and naval systems.

This paper aims at presenting the organizational structure of the only Croatian postgraduate study in maritime studies. Statistics concerning the choice of the research area, postgraduate student affiliation (academia or industry) and participation by women have been provided. The observed trends in these quantities and their possible implications have been discussed. The postgraduate study program description, as well as the enrolment requirements and procedure for the completion of the study have been given. Key issues and challenges related to the future development of the postgraduate study have been identified and examined.

**Keywords:** maritime education, postgraduate education, postgraduate education program, science, academic achievement, research and development.

### 1. Introduction

Postgraduate education belongs to the core activity of universities. The main characteristic of the postgraduate education, which makes it specific, is that the fundamental and primary component is the research. Postgraduate students have to demonstrate the capability of performing self-contained and original research within a scientific field. The number of postgraduate students has rapidly increased in recent years [1], which, together with the changes in the global labour market, represent the main encouragements for universities to carry out reforms of postgraduate study program [2, 3]. In order to prepare young researchers for careers within [4] and outside the academia [5], postgraduate study programs should match the challenges of the global labour market, technological progress, universities' and governments' strategic policy goals, and postgraduate students' demands.

Maritime, as a semantically highly complex concept, means the set of activities, skills, knowledge, science and social relations at sea or related to the sea. Maritime, except maritime economy, encompasses the eminent set of non-economy work, activities and organizations, educational, scientific – research work, health, culture, sport activities at sea, maritime medicine, maritime police, coastguard, navy and others. Maritime economy encompasses a complex set of economic activities that use sea or sea treasures or are directly related to that activities, and are divided into activities related to the production (naval architecture, fishery and others) and to the transport and services (maritime shipping, shipping agencies, transport insurance, maritime agencies, harbours and other). The basis of an adequate, high quality, development of the entire maritime economy and maritime science in general, is a suitable high-level education and scientific research and expert work in a complex domain of maritime affairs.

Educational and scientific research activities at the Faculty of Maritime Studies of the University of Rijeka date back to the year 1866, when the Austrian-Hungarian Imperial and Royal Naval Academy (K.u.K Marine Akademie) started with the regular work [6]. The scientific research fellow of the Academy was Professor Ernst Mach, the world's famous physician and philosopher. He experimentally approved one of his famous and most important theories, the theory of shock wave, just at the K.u.K Marine Akademie in Rijeka. The academy was open until 1914. Disruption in higher education in the field of maritime studies lasted until 1949, when on 4<sup>th</sup> April 1949 the Maritime College in Rijeka was established. The College was transformed into the Faculty of Maritime Studies in 1978 when it became a constituent of the University of Rijeka and continued its work up to the present day. In the domain of science research activities, the Rijeka Faculty of Maritime Studies is a complex scientific – research centre of excellence in maritime affairs directed to the interdisciplinary and multidisciplinary higher education and science projects and research activities. The Rijeka Faculty of Maritime Studies is the oldest component of the University in Rijeka and the oldest and the largest university institution in the domain of maritime affairs in Croatia. Out of the 126 postgraduate studies, which are being performed in different scientific areas and fields in the Republic of Croatia, there is only one, throughout the Croatian territory, in the domain of maritime affairs and is currently performed at the Rijeka Faculty of the Maritime Studies.

## **2. Postgraduate Study: Organizational Structure**

The existing postgraduate study started in 2007 with the introduction of the Bologna system in Europe and Croatia. It could be considered as a continuation of the existing Master and PhD studies at the Faculty of Maritime Studies in Rijeka, which began in the year 1978. Since then, a total of 126 students have been awarded a master's of science (MSc) degree, while 75 students have earned a doctor's (PhD) degree.

Presently, the study represents an integrated, interdisciplinary and interuniversity scientific study with several maritime higher education institutions from the eastern Adriatic coast, two research institutes and the Ministry of Defence of the Republic of Croatia included into. The official title of the study is the "Maritime Affairs" Postgraduate University Study [7]. The responsibility for the study lies on the Faculty of Maritime Studies in Rijeka as the leader of the study, while the collaborative institutions are:

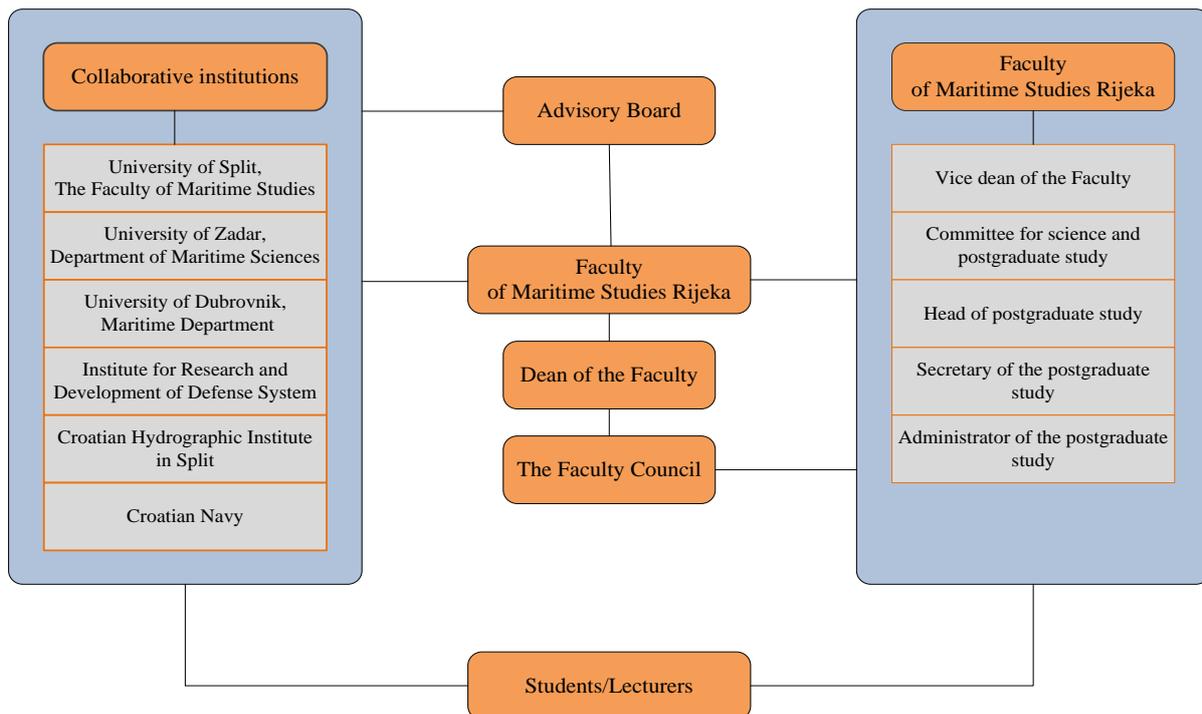
- the University of Split, Faculty of Maritime Studies;
- the University of Zadar, Department of Maritime Sciences;
- the University of Dubrovnik, Maritime Department;
- the Ministry of Defence of the Republic of Croatia, Institute for Research and Development of Defence Systems;
- the Croatian Hydrographic Institute in Split;
- the Croatian Navy.

The study provides nine execution modules [8], opened for all students, and is focused to students with a background in maritime industry. Such an organization provides the possibility for all students to research and study different areas of maritime industry according their preferences. The study represents a continuation of the higher education in accordance with the Bologna process. All students holding a Master Diploma and being allocated with 300 ECTS credits at the undergraduate and graduate study is eligible to register for the postgraduate study.

The study is financed by the student's tuition fee. Mainly, the tuition fee is covered by the students' employer while some of the students pay the study by themselves. The system of scholarship does not exist as yet. The postgraduate study is organized through the internal organizational structure of the Faculty of Maritime Studies in Rijeka. The vice dean in charge for research and postdoctoral study is

directly responsible for the proper organization of the study at the managerial level [9]. The study consists of the following permanent bodies appointed by the Faculty's council [7]:

- Committee for science and postgraduate study,
- Advisory board of the postgraduate study,
- Head of the postgraduate study,
- Secretary of the postgraduate study,
- Administrator of the postgraduate study.

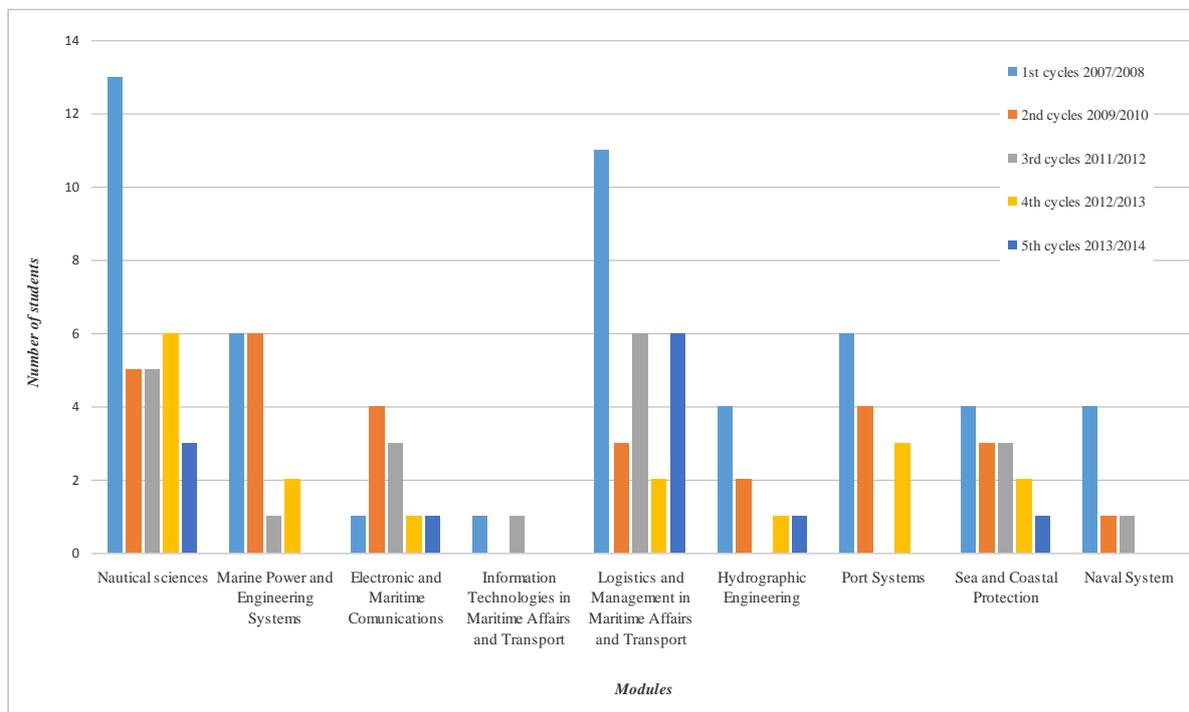


**Figure 1 Organizational Structure of the Postgraduate Study**

The Committee for Science and the Postgraduate Study is the operational body of the postgraduate study. It holds meetings at least twice per semester and consists of the vice dean for research and postdoctoral study, as a committee president, scientific and research project leaders, head of the postgraduate study as well as of all full professors of the Faculty of Maritime Studies in Rijeka. The main tasks of the committee are to manage, organize, run and control all activities related to the postgraduate study. Additionally, the committee has to promote the study through presenting the researches, analysing the student's successfulness and the overall teaching process as well as to make continuous improvements.

The Advisory Board of the Postgraduate Study is a managerial level body with the main goal to propose to the Faculty's council study programs, policies and strategies, and to control the realization of the overall process. The Board represented by the dean and vice-dean for science and research of the Faculty, heads of the collaborative institutions and the head of the postgraduate study. The head of the postgraduate study should be the professor from the leader institution in charge of managing and controlling the teaching process and continuously and operationally following all activities related to the postgraduate study such as planning meetings, making reports etc. The secretary of the postgraduate study organizes all administrative works, prepares documents and deals with the study enrolment process. The administrator of the postgraduate study is an assistant to the secretary.

Since the year 2007, five generations of students have been enrolled in five different study cycles. The total number of the enrolled students amounts to 128, while six students have completed the study successfully.



**Figure 2 Graduated Students by Cycles**

In most cases, students are lecturers and professors coming from the Croatian higher maritime institution and employees of different Croatian maritime related companies and organizations. Out of the total number of 128 students, 36 are employed in one of the Croatian maritime higher education institution, while the rest are employed in maritime industry (shipping, ports, maritime administrations, forwarding agencies, port agencies...). The following table shows the students' successfulness in relation to the place of employment:



**Figure 3 Students' Place of Employment**

Since the very beginning, the number of enrolled students has been decreasing in all modules (Figure 2). The most probable reason for the lack of students is that Croatia, as a relatively small country, cannot provide an adequate number of postgraduate students in maritime affairs each year. Generally speaking, a relatively small number of students have earned a PhD degree. And it is really believed that this is one of the most important issues to be improved. The main reason for that is the unavailability of students to focus on research activities parallel with their regular work, especially for those students employed in maritime related companies. Namely, the Croatian system of employment does not support or even does not allow a year away from regular work for students to make researches and attend the postgraduate study. Furthermore, there is an individual responsibility of each student for the completion of the study and research program. As a specialized study, orientated to the maritime industry where men are prevailing, it should be emphasized that the study is opened for enrolment regardless of sex. At present, 25 women are attending and taking an active part in the study, thus representing 20% off the total number of students enrolled.

### **3. Postgraduate Study Program**

The program of the postgraduate study aims at covering as much wide aspects of maritime science, industry and research activities as possible. The program consists of two connected parts with five types of activities described as activity varying from A to E [7]. The first part includes lectures, while the second part includes research activities leading to the doctoral thesis. The precondition for students to move ahead from one activity to another is regulated by the internal Regulations on the “Maritime Affairs” Postgraduate Study. Each study activity is allocated with ECTS credits. The postgraduate study student can register a total of 180 ECTS credits.

Program development process includes market examination in order to evaluate, analyse and detect needs for scientific research and development activities among relevant stakeholders related to maritime industry. Following the examination, subjects and modules are generated. It is considered that postgraduate study program is oriented to competence based educational activities rather than time based education. Students are encouraged for individual work and research approach to assigned tasks. The lectures are based on two types of courses: fundamental courses and specific courses, which are part of one of the nine specific execution modules.

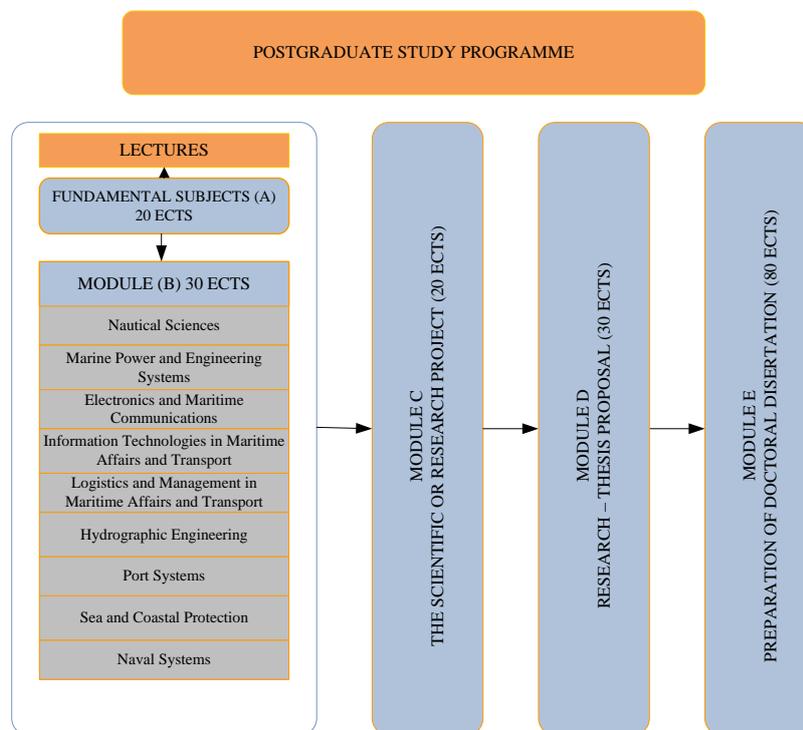
All courses are optional and students have the right to choose them according to their preferences. Activity A is related to fundamental courses, while activity B covers courses of a specific module. Courses in specific modules should be chosen by students who have successfully completed activity A, what means that they have completed the postgraduate study program, have passed all the required examinations and discharged their obligations. In each module specialized courses of the module are offered. Lectures are held on the basis of an approved study program in the form of lectures, tutorials, seminars and scientific papers.

Part of the research activities will start after the activity C lectures have been completed and that is in the form of the student’s participation in the scientific or research project led by the project manager. The student’s obligations are to publish at least one scientific paper in internationally recognized scientific journals. The professor who is responsible for the student's research and work on the project must be allocated to the project manager or student collaborator. The research project provides a practical experience in the research, and is also used to estimate the student’s scientific research capability.

Activity D follows with the student’s obligation to prepare the doctoral thesis proposal. This activity includes the research with the thesis mentor and implies that after selecting the areas of the doctoral dissertation, the student can start with the research that the doctoral thesis proposal is aimed at. The doctoral thesis proposal should be presented in public and confirmed by the commission with a

positive decision brought. After a formal confirmation by the Faculty Council, the student can start with the preparation of the doctoral dissertation together with the mentor appointed to.

The preparation of the doctoral dissertation represents the activity E. The student’s mentor is elected among be professors who have taken part in the postgraduate study, including those from of all collaborating institutions as well. Exceptionally, outside the ranks of professors, an experienced maritime industry expert may be also appointed as a mentor. The mentor assists the student in preparing the thesis and is responsible for the student during the whole period of the student’s work on the doctoral dissertation. The student must submit his dissertation to the evaluation commission within a maximum of five years from the date of acceptance of the thesis proposal. The commission should assess the dissertation and after a positive evaluation the student has to present and defend the dissertation in public and in front of the commission. Following the presentation and defence of the dissertation and the positive evaluation of the evaluation commission, the student can earn a doctor’s (PhD) degree. All processes and activities are controlled by implemented institutional quality management system with fundamental objective to follow student’s advancement and performance.



**Figure 4 Postgraduate Study Program**

The postgraduate study program follows the Faculty strategic policy on maritime education at the highest level where, besides the undergraduate and graduate study, the postgraduate study is also organized [10]. This program is aimed at providing a scientific research throughout the lectures and the student’s taking part into a scientific and research projects for the maritime industry. The program is updated for each enrolment study cycles, following standards of quality in scientific and research activities. By being enrolled in the postgraduate study, each student has the opportunity to approach and develop scientific researches in the field of maritime affairs.

#### 4. Challenges for Future Development

Heterogeneous of maritime scientific disciplines has a significant impact on the organization of the postgraduate study program. Although disciplinary differences are critically important for the quality of the experience and training of postgraduate students, it is a major obstacle for a continuous

update and modernization of the study program. In particular, a large number of academics with a doctorate and a senior tenured position are required to provide teaching, mentorship and research projects, covering a wide range of different disciplines. Moreover, the duration of the postgraduate study should to be adopted, as it is closely connected with funding. The students who work on interdisciplinary projects are faced with problems related to mentorship, assessment and evaluation of their work. Therefore, students may choose a less risky research topic to complete the study successfully. As a consequence, the scientific development and inter-disciplinary collaboration could be limited.

The selection of postgraduate student candidates plays a very important role in achieving expected quality of postgraduate studies. The observed trend of the slightly decrease of enrolled students (Figure 2), which is attributed to the lack of potential candidates, encourages to shift the postgraduate study to international candidates. In order to attract foreign candidates, courses program, related documents and lectures are provided in the English language. As a part of the recruitment process, in addition to the administrative requirements fulfilling (adequate diploma with excellence) and presentation of their own research proposal, the candidates may pass an exam in the English language.

Mobility and inter-institutional collaboration are an integral part of the postgraduate study at the Faculty. Although mobility and collaboration within the Croatian institutions are intensive, we consider that international mobility is an important strategic tool of the postgraduate study, which allows wider research experience and career development opportunities of postgraduate students, as well as improved collaboration between institutions. The Faculty seeks to provide appropriate international mobility and inter-institutional collaboration mechanisms to enhance students' expertise in relevant fields. However, we face numerous obstacles of a financial, legal, administrative and personal character that currently limit mobility and collaboration mostly within Croatia.

Following the intention for intensifying the international candidates enrolment, we plan to increase the number of internationally recognised experts engaged in the study (currently, three engaged professors are from foreign institutions, from Hungary and Slovenia). This kind of international cooperation would bring about more opportunities for students to participate on the international scientific and research project managed by international academic staff. We consider that the International Association of Maritime Universities (IAMU) could serve as a main pool of experts, enhancing relations between the world's maritime universities and faculties at the highest level of education.

## **5. Conclusion**

The maritime related postgraduate education in Croatia has been presented. The only active Croatian maritime related postgraduate study, performed by the Faculty of Maritime Studies Rijeka, is organized as an interdisciplinary, integrated and interuniversity scientific study that encompasses four maritime higher education institutions, two research institutes and the Ministry of Defence of the Republic of Croatia. The program of the postgraduate study is designed to cover wide aspects of maritime science, industry and research activities. The program is based on a nine execution modules and consists of two main parts, lectures and research activities that lead to a doctoral thesis. The identified key issues and challenges related to the future development could be seen as a tool for quality improvement of the postgraduate study, its better recognition among scientists as well as among practitioners from the maritime industry, and as a tool for serving industry in scientific research activities.

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