FACULTY OF MARITIME STUDIES
UNIVERSITY OF SPLIT

DETAILED PROPOSAL OF THE STUDY PROGRAMME

POSTGRADUATE UNIVERSITY STUDY TECHNOLOGIES IN MARITIME AFFAIRS

SPLIT, 2018.

BASIC INFORMATION ABOUT THE UNIVERSITY

Name of higher education institution	University of Split Faculty of Maritime Studies
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GENERAL INFORMATION ABOUT THE STUDY PROGRAMME

Name of study programme	Postgraduate University Study Technologies in Maritime Affairs		
Study programme provider	University of Split		
Study programme co-provider	Faculty of Maritime Studies (PFST)		
Type of study programme	Professional study programme ☐	University study programme ☒	
Level of study programme	Undergraduate ☐	Graduate ☐	Integrated ☐
	Postgraduate university ☒	Postgraduate specialist ☐	Graduate specialist ☐
Academic/professional title acquired upon completion of studies	Doctor of Science in the Field of Technical Sciences		

1. 1. INTRODUCTION

1.1. Assessment of the justification for conducting a doctoral school

Postgraduate education is important for the development of Croatia, especially the Dalmatian region. Technical knowledge in maritime science is applied in many economic systems: maritime transport, shipbuilding, mechanical engineering, fisheries, logistics, freight forwarding, etc. The European Commission, together with the industry, is engaged in encouraging the development of new educational programmes in this field as a prerequisite for the development of society. The need to increase the number of educated experts and scientists in the technical field of maritime transport is highlighted in the Development Strategy of the Republic of Croatia for the 21st Century[1].
The relatively rapid development of technology, driven by new knowledge and achievements, also requires an appropriate level of education. A prerequisite for the development of society is investment in education and science and the promotion of new and innovative solutions that are the basis for the development of industry.[2]. Knowledge related to maritime transport is developing daily with the advancement of technology. Croatia has around 27,000 seafarers. (BIMCO, Report 2015)[3]. So far, around 7,800 students have graduated from the Faculty of Maritime Studies in Split. Some students who wanted to continue their education in the field of technical sciences, traffic and transport technology, continued their education at related faculties (Faculty of Maritime Studies in Rijeka and Faculty of Transport Sciences in Zagreb), and some of them continued their education in the field of electrical engineering and electronics or mechanical engineering and naval engineering (Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture in Split, Faculty of Mechanical Engineering and Naval Architecture in Zagreb, Technical Faculty in Rijeka, etc.). The Faculty of Maritime Studies has been only marginally involved in the education of its doctoral candidates, and this is considered one of the greatest shortcomings of the Faculty.

Of fundamental importance is the fact that scientists from the Faculty of Maritime Studies in Split actively participate in the development of scientific and professional fields by directly participating in and conducting scientific research. Scientific cooperation with renowned foreign scientific institutions is one of the fundamental commitments of the Faculty.

Since the establishment of the Faculty, there has been intensive cooperation with economic entities directly interested in transferring experiences from practice to teaching, i.e. updating teaching materials, but also in establishing cooperation in numerous projects and scientific research:

- with companies: Brodosplit, Brodotrogir, Croatian Register of Shipping, TLM, Adria Winch, Končar EU, Plovput, Globtik, Pasat, Jadroplov, etc.
- institutes: Croatian Hydrographic Institute, Oceanographic Institute
- Local governments: port authorities, City of Split, Split-Dalmatia County.

This cooperation is particularly evident in teaching bases, student professional practice, the development of studies and reports, and cooperation at an international scientific conference.

[1] http://www.mvep.hr/files/file/publikacije/NPPEU_2004_1.pdf
[2] Cyranoski D, Gilbert N, Ledford H, Nayar A, Yahia M. The Phd Factory. Nature. 2011; 472:276-279.
[3] https://www.bimco.org/products/publications/other-manuals/manpower-report-2015

The Faculty organizes the International Maritime Science Conference (IMSC) and publishes the journal Transactions on Maritime Science (ToMS)[4].

The Faculty of Maritime Studies in Split has around 1,600 students. Students from the Split-Dalmatia, Dubrovnik-Neretva, Šibenik-Knin and Zadar counties gravitate to the Faculty.

The Faculty launched four of its own scientific projects from VIF funds in 2018, and is participating in the Functional Integration of Three Faculties (Infrastructure Funds) project, which aims to enhance scientific excellence.

1.2. Compliance with the requirements of professional associations

The study programme of the Postgraduate University Study Technologies in Maritime Affairs is aligned with the recommendations of the European Society for Engineering Education SEFI (*The European Society for Engineering Education*)[5]. The basic recommendations of SEFI for postgraduate university studies, with which this study programme is aligned, are as follows:

- the doctorate must be the result of individual research work
- the doctorate is the third level qualification within the Bologna Process
- flexibility of doctoral education
- improved quality of mentoring
- admission to the study must be clear and transparent
- the study programme should not be in the form of a formal curriculum.

1.3. Partners outside the higher education system

Many faculty members have established scientific collaborations with world-class universities and institutes. Of particular importance is the collaboration of the faculties with leading international and domestic companies on projects and scientific research involving doctoral students. There are a number of agreements between the faculties on cooperation in promoting scientific and educational activities with the following organizations:

- from the economic and public sector such as Split-Dalmatia County, Croatian Academic and Research Network - CARNet, Croatian Register of Shipping, Brodosplit, Siemens
- companies engaged in crew boarding in the Republic of Croatia: Pasat, Gollar Shipping
- companies engaged in maritime transport: Jadroplov, NYK, Brodospas, Dorian, Tankerska plovidba, Plovput d.o.o.
- local governments, etc.

Possible partners outside the higher education system who have so far shown interest and established cooperation during the preparation of postgraduate study programmes (some of them are ready to act as teaching bases and provide assistance with available equipment) and plan to train young people are:

- Croatian Register of Shipping
- Croatian Hydrographic Institute

[4] http://www.unist.hr/Portals/0/docs/ostali%20dokumenti/Znanstveni%20%C4%8Dasopisi.pdf
[5] https://www.sefi.be/

- Plovput d.o.o.
- Pasat d.o.o.
- IVA d.o.o.
- Jadrolinija d.o.o.
- Jadroplov d.d.

1.4. Financing method

The Postgraduate University Study Technologies in Maritime Affairs will be financed from the tuition fees of doctoral students. The money from the tuition fees will be used for the needs of education and scientific research work, i.e. to pay for the costs of external cooperation (with other universities in the Republic of Croatia and abroad) and mentoring work. External cooperation will also be financed from CEEPUS funds, the Erasmus Plus programme, student tuition fees, etc. For doctoral students employed as assistants, the faculties and the University cover the costs of studying.

1.5. Comparability of the study programme with programmes of accredited higher education institutions in Croatia and the European Union

The Faculty actively monitors the development of higher education in the world, especially in Europe. When developing the study programme of the Postgraduate University Study Technologies in Maritime Affairs, similar European programmes and programmes outside the European continent, were considered. The system of education of scientists and experts in the world and Europe in this area is very diverse and interdisciplinary, and there are no two countries in which the education system is the same.
The programme covers a wide area of technical sciences focused on maritime technologies. It should be emphasized that the choice of subjects is completely free in agreement with the mentor, so the student can also focus on interdisciplinary research in various scientific fields.
The programme of the Postgraduate University Study Technologies in Maritime Affairs can also be found in a number of other similar domestic and European postgraduate studies. The structure of the proposed study programme is comparable (in scientific area and field) with the study programmes of similar higher education institutions in Croatia:

- Doctoral study in Maritime Studies, Faculty of Maritime Studies, University of Rijeka
- Doctoral study in Technological Systems in Traffic and Transport, Faculty of Transport and Communications, University of Zagreb.

It is also comparable to similar study programmes at renowned European universities. The following foreign study programmes are particularly noteworthy:

- École Polytechnique Fédérale de Lausanne – EPFL, Lozana, Švicarska (http://phd.epfl.ch/EDME)
- Faculty of Mechanical Engineering, University of Maribor, Maribor, Slovenia (http://www.fs.uni-mb.si/podrocje.aspx?id=733)
- Universidad de Lisboa, Lisboa, Portugal (https://ciencias.ulisboa.pt/en/cursos/ /estatistica-e-investigacao-operacional)

1.6. The openness of studies towards student mobility (horizontal, vertical in the Republic of Croatia and international)

The Postgraduate University Study Technologies in Maritime Affairs supports the mobility of students and professors from Croatia and abroad, including the Faculty of Mechanical Engineering and Naval Architecture of the University of Zagreb, the Faculty of Technology of the University of Rijeka, the Faculty of Mechanical Engineering in Slavonski Brod of the University of Osijek, the Faculty of Maritime Studies in Rijeka, the maritime departments of the University of Zadar and the University of Dubrovnik, the Faculty of Transport and Communications in Zagreb, the Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, and others.

Students are allowed to complete part of their study programme at a similar institution in Croatia or abroad. In international cooperation, student and professor exchange is possible through the Erasmus Plus programme. The postgraduate study programme Technologies in Maritime Affairs will rely on internationalisation in its implementation, especially in teaching in English, exchange of professors, admission of foreign students, etc.

1.7. Compliance with the mission and strategy of the University and the proponent, as well as with the strategic document of the higher education

In 2015, the National Council for Human Resources Development issued a recommendation for STEM fields: "Taking into account the tasks defined in Article 10 of the Act on the Croatian Qualifications Framework (NN, No. 22/13) according to which the National Council for Human Resources Development issues recommendations on the process of planning and development of human resources in accordance with the development strategy of the Republic of Croatia and issues an opinion on the recommendations of sectoral councils on enrolment policy, enrolment quotas and financing of qualifications from public sources, by qualifications and by counties, in the absence of recommendations from sectoral councils, and in accordance with its vision and mission, the National Council for Human Resources Development has decided to issue recommendations on a sector-oriented approach to defining enrolment quotas in secondary and higher education."[6]

Item 2 recommends maintaining the total enrolment quota of students in study programmes in the Republic of Croatia with reallocations in accordance with the recommendations for educational enrolment policy and scholarship policy of the Croatian Employment Service. It is necessary to increase enrolment quotas in the field of natural sciences, technology, engineering and mathematics, the so-called STEM field, and reduce enrolment quotas in social sciences with the exception of certain qualifications in the social and humanities fields classified as deficit occupations. This recommendation is proposed to be implemented by measures defining the amount of full participation subsidy for the costs of studies of full-time students, or by programme agreements between higher education institutions and the Ministry of Science, Education and Sports.

In October 2015, the Senate of the University of Split adopted the Strategy 2015 - 2020. The same strategy defines the mission of the University through improvement, research and innovation and cooperation with the local community, especially in the economy through the transfer of knowledge and technologies.[7]

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[6] https://vlada.gov.hr/UserDocsImages//Sjednice/2016/12%20sjednica%20Vlade//12%20-%204.pdf

[7] www.kvalifikacije.hr/fgs.axd?id=1061

The first point of the Strategy "Science, Research, Art and Creativity" also defines five strategic goals:
STRATEGIC GOAL 1. The University of Split is a research university recognized in the European Research Area.
STRATEGIC GOAL 2. The scientific and research activities of the University of Split contribute to the development of the region, the Republic of Croatia and the European Union.
STRATEGIC GOAL 3. Interdisciplinary cooperation between scientists is encouraged through the functional integration of scientific and research activities at the University and in cooperation with other domestic and foreign scientific and research institutions and the economy.
STRATEGIC GOAL 4. Artistic creativity is encouraged with an emphasis on the interdisciplinary interaction of cultural heritage and contemporary creative industries.[8]

In addition to the mission and vision of the University of Split, the following strategic documents were used as guidelines when setting strategic goals:

- European Strategy for Advanced, Sustainable and Inclusive Growth EUROPE 2020
- Strategic documents of the European Research Area (ERA), Strategic documents of the European Higher Education Area (EHEA)
- Strategy of Education, Science and Technology of the Republic of Croatia.[9]

The Postgraduate University Study Technologies in Maritime Affairs is in line with the mission, vision and strategic goals adopted in the Development Strategy of the University and the Faculty of Maritime Studies in Split, which participate in it, for the period 2012-2016, and the Science Development Strategy of the Faculty of Maritime Studies in Split 2017-2022. The Postgraduate University Study Technologies in Maritime Affairs can be compared to similar doctoral studies held at the Faculty of Transport Sciences and the Faculty of Maritime Studies of the University of Rijeka. These postgraduate studies educate staff with a similar academic title. However, the concept of studying at the doctoral study programme at the Faculty of Maritime Studies in the University of Split differs from the aforementioned ones in the following ways:

- sustainability of studies
- study concept
- internationalization
- enrolment of potential students
- choice of topic and mentor
- financing of research work
- ratio of teaching to research work.

The Postgraduate University Study Technologies in Maritime Affairs will not be financed by the University or the Faculty of Maritime Studies. The tuition fee is sufficient for the education of students and the work of the study.
The classes will consist of two mandatory and three elective Subjects. The tuition fee will be used for the research work of the students and to pay for the study costs. The amount of tuition fees and the amount of funding for the projects in which the students would be involved should be sufficient for the scientific research process until the creation of a doctorate.

[8] www.unist.hr/Portals/0/docs/.../UNIST_STRATEGIJA_2015_2020_.pdf
[9] ibidem

The classes held by professors from the Faculty will be held without a special teacher's fee, so no special costs are planned for teaching. Guest lecturers will be paid.
Professors involved in the work of the doctoral study will be from the Republic of Croatia and abroad. The doctorate will be written in English. Classes will be held in Croatian and English.
Students who enrol based on an invitation must choose a mentor and the area in which they want to do research before enrolling. The mentor must be competent and assess the student's potential. The mentor will develop the doctoral student's research plan together with the doctoral student. Funds for research will be obtained from tuition fees and funds. The foundation of studying is research work.

The proposed study programme is aligned with the strategic document Network of Higher Education Institutions and Study Programmes in the Republic of Croatia, according to which the opening of study programmes in the STEM field, to which the proposed study programme also belongs, is encouraged.

The organization of the Postgraduate University Study Technologies in Maritime Affairs is based on the following:

1. Conclusions and recommendations, Bologna Seminar on Doctoral Programmes for the European Knowledge Society, Salzburg, 2005
2. Final conclusions, Bologna Seminar on Matching Ambition with Responsibilities and Resources, Nice, 2006
3. Doctoral studies in Europe: excellence in researcher training, LERU – League of European Research Universities, 2007
4. Europe's Universities beyond 2010: Diversity with a common purpose, Lisbon Declaration, 2007
5. Europe's Universities – Looking Forward with Confidence, Prague Declaration, 2009 Doctoral studies, Croatian Science Foundation, 2006.

The Postgraduate University Study Technologies in Maritime Affairs is structured in such a way that it can easily be merged into the Doctoral School of the University of Split in the near future, because the programme is oriented towards the technical field of traffic and transport technology, which is offered at the University only at the Faculty of Maritime Studies.
In the Strategy for Education, Science and Technology adopted by the Croatian Parliament on 17 October 2014, in the chapter Doctoral Schools and Postdoctoral Education, the following is emphasized:
"The importance of doctoral education and doctoral schools is a constant interest of the EU in all member states, including Croatia and all neighbouring countries. The goals set for doctoral schools are research excellence, the possibility of interdisciplinary research, an attractive institutional environment, openness to the economy and other sectors, international networking, internationalization of doctoral studies, including doctoral students and mentors from abroad, acquisition of transversal skills and professional development of researchers, and quality assurance. "[10]
A screening will be conducted upon enrolment in doctoral studies, doctoral research will be linked to research projects and the best research groups, and doctoral training will be established.

[10] https://narodne-novine.nn.hr/clanci/sluzbeni/2014_10_124_2364.html

Cooperation will be achieved and the research and mentoring potential of scientific institutes will be used, as well as the research resources of the business sector and social activities. Previous experiences in implementing equivalent or similar programmes show that of the total number of students enrolled in existing doctoral studies in the period 1999-2011, only 11% completed[11].

Such a low pass rate is a consequence of the following:

- insufficiently clear study rules
- insufficiently good teaching curricula
- lack of motivation during studies
- insufficient focus on subjects from industry and economy.

The passing rate is even lower if a doctoral student comes from the industrial sector and studies part-time. The low passing rate of students from the industrial sector is a result of the extended way of studying, but also of modern trends of changing professions due to advancement, better fees, etc. Doctoral students from the industrial sector are also not sufficiently motivated to study because their personal income and advancement most often do not depend on their newly acquired title.

Doctoral students in the existing system of doctoral studies who come from scientific institutes and scientific-teaching institutions see the reason for their failure in studying as mandatory classes that are not based on the direction of their research and the small number of quality mentors who are often busy with other scientific-research projects.

In addition to the above, the current conditions for enrolling in postgraduate studies can be considered insufficient, and the quality of newly enrolled doctoral students questionable. The conditions for enrolling in the study are as follows:

- minimum grade point average during undergraduate and graduate studies of 3.5
- average of study during undergraduate and graduate studies less than 3.5; but with the recommendation of three professors in a scientific-teaching position
- previous scientific work.

Such admission criteria do not guarantee successful studies. Students usually choose a dissertation topic at the end of the academic cycle, and immediately before the defence of the topic, a mentor is chosen. The selection of the mentor is confirmed by the Postgraduate Studies Council based on the compatibility of the topic and the mentor's scientific work. This leads to the conclusion that the mentor and doctoral student only start working together halfway through their postgraduate studies, which does not contribute to success in scientific research work. In addition, neither the mentor nor the doctoral student have shared experience in research work until then, and valuable time is lost in getting to know the methods of scientific work and research and the habits of the other.

"The research work of the students, in addition to tuition fees, will be financed from the funds of projects that the students will apply for and implement with the technical assistance of the Faculty's Service for Science, Projects and Cooperation.

In this way, the students will also acquire transversal skills in attracting external funding for research projects, which are necessary in taking advantage of funding opportunities from ESI funds and European programmes. “

[11] Viđak M., Tokalić R., Marušić M., Puljak L., Sapunar D. Improving completion rates of students in biomedical PhD programmes: an interventional study. 2016, submitted

Most of the University of Split's constituent units do not keep statistics on the success and length of study. For example, in the Croatian doctoral studies of medicine in the period 1998-2006, the length of study in doctoral studies was over 7 years.[12]. It is estimated that the analysis of the performance of other components of the University would give a similar result.

According to the recommendations of the Association of Maritime Universities, an emphasis on mentored research work is recommended. Innovation in writing dissertations with a clear scientific contribution and application in the Republic of Croatia is encouraged. The low pass rate (7%) in the postgraduate study of Maritime Studies (the host institution is the University of Rijeka, the cooperating institution is the Faculty of Maritime Studies in Split) is a problem that will be solved by increased mentoring and better selection of students.

[12]Viđak M, Tokalić R, Marušić M, Puljak L, Sapunar D. Improving completion rates of students in biomedical PhD programmes: an interventional study. 2016, submitted

2. STUDY PROGRAMME DESCRIPTION

2.1. General

Scientific/artistic field of the study programme	technical sciences
Duration of the study programme	at least 3 years
Minimum number of ECTS credits required to complete	180
Study admission requirements and admission procedure	The curriculum of the postgraduate study programme in Maritime Technologies enables scientific training for various categories of applicants: • applicants with completed undergraduate and graduate studies in relevant scientific fields and achieved at least 300 ECTS credits • applicants with completed university undergraduate studies in relevant scientific fields according to the Law on Higher Education Institutions (Official Gazette No. 59 of 17 July 1996) or the laws on higher education in force at that time • applicants with a Master of Science degree in relevant scientific fields and branches • applicants who have completed postgraduate scientific studies for the acquisition of a Master of Science degree in relevant scientific fields and branches and passed all exams, but have not defended their Master of Science degree • applicants who have achieved scientific achievements that, in their significance, meet the requirements for election to scientific titles in relevant scientific fields, and a doctorate in science can be obtained by enrolling in a postgraduate study for scientific improvement and writing a doctoral thesis without attending classes and taking exams • applicants who have started studying at related postgraduate studies (ECTS recognition and differential exams are determined by the Postgraduate Study Committee) • The Committee's interview with the doctoral candidate is a mandatory component of the enrolment process, where all necessary conditions for completing the study within the stipulated deadline are clearly defined. • A doctoral candidate who studies part-time must submit a statement upon enrolment that his/her available working hours enable him/her to fulfil his/her student obligations according to the study plan. The relevant scientific fields and branches are as follows: 2.2 Shipbuilding 2.3 Electrical engineering 2.05 Civil engineering (supporting structures, hydraulic engineering)

	2.8 Metallurgy 2.9 Computer Science 2.10. Mining, Petroleum and Geological Engineering 2.11 Mechanical Engineering 2.12 Traffic Technology and Transport (Road and Rail Transport, Maritime and River Transport) 2.14 Aviation 2.15 Basic Technical Sciences. Enrolment in postgraduate studies is carried out based on the Decision of the Faculty Council. The Faculty publishes a call for applications in the press and on its website with the requirements for enrolment. The requirements for enrolment vary according to the category of applicant. **Enrolment requirements for applicants with a completed graduate degree according to the Act on Scientific Activity and Higher Education** The postgraduate study programme in Maritime Technologies can be enrolled by applicants who have completed a university graduate study programme in relevant scientific fields and have achieved at least 300 ECTS credits, subject to the following conditions: • They have a recommendation from a professor who is involved in postgraduate studies in a technical field and which also includes future mentoring. • They know English to use scientific and professional literature. • The interview of the Committee with the doctoral candidate is a mandatory integral part of the enrolment procedure, during which all necessary conditions for completing the study within the stipulated deadline are clearly defined. • A doctoral candidate who studies part-time must submit a statement upon enrolment that the available working hours allow him to fulfil his student obligations according to the study plan. • Before enrolment, the applicant must, in agreement with the mentor: - propose a preliminary topic for the doctoral thesis: a proposal for the title of the doctoral thesis in Croatian and English - explain the preliminary topic for the doctoral thesis - propose the basic goal and research plan - propose the methodology and research flow chart - determine the expected original scientific contribution of the doctoral thesis, - attach a list of papers, copies of published papers and evidence (certificates) of other activities for which the applicant has received ECTS credits - propose a financial research plan - attach a short CV of the applicant with a description of scientific and professional activities.

	• Doctoral students who have started their studies at other related postgraduate studies may request enrolment in the study with the recognition of ECTS credits. The recognition of credits is determined by the Postgraduate Study Committee. For applicants who have completed a relevant university graduate study at foreign universities, eligibility for admission to the Postgraduate University Study Technologies in Maritime Affairs is determined by the selected mentor and the Postgraduate Study Committee. Enrolment may also be granted to applicants who have completed a graduate study within the scientific field of technical sciences at one of the technical faculties, with the requirement to take differential exams due to programme differences. The content of the differential exams is determined by the Postgraduate Study Committee. **Enrolment requirements for applicants with completed undergraduate studies according to the Higher Education Act** The Postgraduate University Study Technologies in Maritime Affairs can be enrolled by applicants who have completed a university graduate study programme in relevant scientific fields and have achieved at least 300 ECTS credits, subject to the following conditions: • They have a recommendation from a professor involved in the postgraduate study, which also includes future mentoring • The Committee's interview with the doctoral candidate is a mandatory integral part of the enrolment procedure, where all necessary conditions for completing the study within the stipulated deadline are clearly defined. • A doctoral candidate who studies part-time must submit a statement upon enrolment that the available working hours allow him to fulfil his student obligations according to the study plan. • Before enrolment, the applicant must, in agreement with the mentor: - determine the preliminary topic of the doctoral thesis: proposal of the title of the doctoral thesis in Croatian and English - explain the preliminary topic - propose the basic goal and research plan - propose the methodology and research flow chart - determine the expected original scientific contribution of the doctoral thesis - attach a list of works, copies of published works and evidence (certificates) of other activities for which the candidate has received ECTS credits - propose a financial research plan - attach a short CV of the candidate with a description of scientific and professional activities.

	Doctoral candidates who have started their studies at other related postgraduate studies may apply for admission to the study with the recognition of ECTS credits. The recognition of credits is determined by the Postgraduate Studies Committee. For applicants who have completed a relevant university graduate study at foreign universities, eligibility for admission to a postgraduate study in a technical field is determined by the Postgraduate Studies Committee. Enrolment may also be granted to applicants who have completed a graduate degree in the scientific field of technical sciences at one of the technical faculties, with the requirement to take differential exams due to programme differences. The content of differential exams is determined by the Postgraduate Study Committee. **Admission requirements for applicants with a Master of Science degree** The postgraduate university study programme in Maritime Technologies can be enrolled by applicants who have obtained a Master of Science degree in appropriate scientific fields and branches in the Republic of Croatia or equivalent scientific fields from abroad. Enrolment may also be granted to applicants who have obtained a Master of Science degree in other related fields and branches of technical sciences, with the requirement to take differential exams due to programme differences. The content of differential exams is determined by the Postgraduate Study Committee. Applicants with a Master of Science degree are enrolled in the 4th semester of postgraduate study under the following conditions: • They have a recommendation from a professor involved in the postgraduate study, which also includes future mentoring. • The Committee's interview with the doctoral candidate is a mandatory integral part of the enrolment procedure, where all necessary conditions for completing the study within the stipulated deadline are clearly defined. • A doctoral candidate who studies part-time must submit a statement upon enrolment that the available working hours allow him to fulfil his student obligations according to the study plan. • Before enrolment, the applicant must, in agreement with the mentor: - propose a preliminary topic for the doctoral thesis: a proposal for the title of the doctoral thesis in Croatian and English - explain the preliminary topic - propose the basic goal and research plan - create a methodology and research flow chart - determine the expected original scientific contribution of the doctoral thesis

	- attach a list of papers, copies of published papers and evidence (certificates) of other activities for which the applicant has received ECTS credits - propose a financial research plan. Doctoral students who have started their studies at other related postgraduate studies may apply for admission to the study with the recognition of ECTS credits. The recognition of credits is determined by the Postgraduate Study Committee. **Number of applicants and selection process** The number of applicants who enrol in the university postgraduate study in Maritime Technology is limited and is based on the Decision of the Faculty Council in accordance with the available capacity. The number of applicants who enrol in the study in the current academic year is limited. The criteria for evaluating applicants include success in graduate or undergraduate studies, demonstrated interest in scientific research, published works, recommendations for postgraduate studies, selection of a potential mentor, proposal for a research topic, scientific research plan, and proposal for scientific research equipment to be used. If more than one applicant applies for enrolment in the university postgraduate study in Maritime Technology, the Postgraduate Study Committee prepares a ranking list that is confirmed by the Faculty Council. Applicants who have completed the postgraduate scientific study for the acquisition of a Master of Science degree and have not obtained a Master of Science degree, as well as applicants who have obtained a Master of Science degree, are enrolled in the university postgraduate study in Maritime Technology without a placement exam and outside the enrolment quotas. For persons who have achieved scientific achievements and can obtain a doctorate by enrolling in a postgraduate study programme for scientific advancement and writing a doctoral thesis without attending classes and taking exams, special enrolment conditions are prescribed in accordance with the Act on Scientific Activity and Higher Education.

2.2. Learning outcomes of the study programme

The doctoral candidate acquires the highest level of competences (8.2) according to the Croatian Qualifications Framework (CRO), which relate to the creation and evaluation of new facts in the field of scientific research, which leads to the advancement of the boundaries of knowledge. He also develops social skills, independence and responsibility in work. Specific learning outcomes at the level of the Postgraduate University Study Technologies in Maritime Affairs are:

1. Apply advanced mathematical, physical and scientific principles in the research and

development of new technologies, ideas or processes in technical sciences.
2. Create and evaluate new facts, procedures and theories that, based on the results of the research, lead to new insights in the field of scientific research.
3. As an author or co-author, write and successfully publish a paper in an internationally peer-reviewed journal referenced in the SCI, CC or SCI-Expanded database.
4. Prepare and present a public statement on the results and scientific insights at an international scientific conference.
5. Argue your opinion and defend your position in a discussion with other scientists in the field of research.
6. As a collaborator or project leader, design scientific research in the field of technical sciences.
7. Critically assess published original scientific results of other authors in the field of your research.
8. Analyse and evaluate new and specialized knowledge, methods, tools and instruments in the field of scientific research.
9. Apply methods for defining and protecting intellectual property.
10. Present and explain the results of scientific research to other scientists and non-professionals.
11. Take ethical and social responsibility for the success of research and the possible consequences of the impact on the wider community.
12. Plan and lead multidisciplinary and international scientific projects (drafting scientific research, organizing research, timely detection of potential problems, determining necessary resources, leading a research team).
13. Write and report (speaking and listening skills, ability to present data and research results).
14. Face new challenges in society and the economy and contribute to social and economic development by applying the results of scientific research.
15. Analyse and evaluate different sources of scientific data.
16. Write and present a scientific paper in the field of technical sciences using scientific methods.
17. Choose appropriate scientific methods suitable for research in the field of technical sciences.
18. Plan and conduct research independently under the supervision of a mentor or as part of a team.

2.3. Employment opportunities

The most successful PhDs can be employed at the University, at the faculties in the field of technical sciences, at institutes and in industry in the Dalmatian region and the Republic of Croatia. Among the institutions, in addition to the University of Split, it is worth noting:

- Croatian Register of Shipping
- Croatian Hydrographic Institute
- Oceanographic Institute.

Since the postgraduate university study should have an industrial orientation and the possibility of implementing the European Industrial Doctorates (EID) programme and Marie Sklodowska Curie funds, emphasis is also placed on industrial partners from the following technological areas:

- shipbuilding
- mechanical engineering

- electronics and energy
- maritime transport.

There are two shipyards operating in the County: Brodosplit and Brodotrogir, two repair shipyards: Brodoremont Trogir and Brodoremont Vranjic, and a number of manufacturers that maintain a century-old tradition in the construction and repair of small vessels.

Our shipbuilding is individual, not serial. It is focused on more demanding, higher-quality, more complex and sophisticated projects in newbuilding. When designing each new ship, in addition to domestic knowledge, top-notch world knowledge and achievements are used.

The strongest and highest-quality mechanical engineering capacities are intended for shipbuilding and the nautical programme. The diesel engine factory d. o. o. Split produces two-stroke slow-speed and four-stroke medium-speed and high-speed diesel engines under license from M.A.N. B&W. Dalstroj d. d. Split – Adria Winch d. o. o. produces marine and nautical deck equipment.

The following companies are recognized in the design, construction, production, assembly and testing of electrical devices, electronic equipment, solar cells and solar devices: Končar električni uređaji d. d. Split, a company with many years of top references in the field of engineering, design, production, assembly, testing and commissioning of low and medium voltage electrical devices and equipment.
PCE – Maritime Centre for Electronics d.o.o. Split is a project development software and hardware centre for the most complex electronic devices.
Among the maritime transport companies, it is worth highlighting: Plovput d.o.o, Jadroplov Split, Croatian Hydrographic Institute, Croatian Register of Ships, Marin Consult, Port of Split, maritime agencies for seafarer embarkation Golar, IVA, Orient d.o.o. Pasat d.o.o. and others.

2.4. Possibility of continuing studies at a higher level

Completing your studies and obtaining the academic title of Doctor of Science enables further education in postdoctoral Subjects, studies and advanced training.

2.5. Study/s of the lower level of the proposer or other institutions in the Republic of Croatia from which it is possible to enrol in the proposed study

Graduate university studies leading to admission to the Postgraduate University Study Technologies in Maritime Affairs:

- Graduate University Study Programme Mechanical Engineering
- Graduate University Study Programme Industrial Engineering
- Graduate University Study Programme Marine Nautical Engineering
- Graduate University Study Programme Marine Engineering
- Graduate University Study Programme Marine Electrical and Information Technologies
- Graduate University Study Programme Marine Systems and Processes
- Graduate University Study Programme Marine Technologies of Yachts and Marinas
- Graduate University Study Programme Nautical Science and Technology of Maritime Transport
- Graduate University Study Programme Marine Engineering and Technology of

Maritime Transport
• Graduate University Study Programme Transport Technology and Organization
• Graduate University Study Programme Logistics and Management in Maritime and Transport
• Graduate University Study Programme Road Transport
• Graduate University Study Programme Urban Transport
• Graduate University Study Programme Information and Communication Transport
• Graduate University Study Programme Postal Transport
• Graduate University Study Programme Water Transport
• Graduate University Study Programme Air Transport
• Graduate University Study Programme Railway Transport
• Graduate University Study Programme Intelligent Transport Systems and Logistics
• Graduate University Study in Logistics
• Graduate University Study in AeroNautical Studies
• Integrated Military Maritime Studies (Military Nautical Studies and Military Naval Engineering)
• Graduate University Study in Electrical Engineering
• Graduate University Study in Electronics
• Graduate University Study in Computer Science.

The Postgraduate University Study Technologies in Maritime Affairs may also be enrolled by applicants who have completed graduate studies at other faculties in the appropriate scientific field, in accordance with the defined admission requirements. Enrolment may also be granted to applicants who have completed graduate studies in related scientific fields and branches at one of the technical faculties. The content of differential exams is determined by the Postgraduate Study Committee. Students who have started studying at other postgraduate studies may enrol in the postgraduate study in Maritime Technologies, following the same enrolment procedure, with the recognition of exams and scientific research papers or, if necessary, taking differential exams. The method of enrolment by transfer is decided by the Postgraduate Study Committee. Students whose rights to study at other postgraduate studies have expired cannot request the recognition of exams and papers by the Council.

2.6. Conditions and method of studying

Enrolments

More attention needs to be paid to the quality of the admission criteria. Therefore, the mentor will be selected before enrolling in the postgraduate study. The student can enrol only after the mentor accepts the doctoral candidate for future joint scientific research work during the study. The mentor should prepare a preliminary scientific research plan and a proposal for the equipment on which the research would be carried out. This scientific research plan, as well as the topic, are evaluated by the Postgraduate Study Committee.

Study time

The postgraduate study lasts a minimum of three (3) years, or six (6) semesters. It is designed as a full-time study with a full workload for doctoral students, but it can also be carried out as a part-time study.

The postgraduate study for doctoral students studying full-time lasts three (3) years, but in justified cases it can be extended up to five (5) years by decision of the Faculty Council. The part-time study lasts five (5) years, and for justified reasons, decided by the Faculty Council, it can be extended up to seven

(7) years with justification. In particularly justified cases, the Faculty Council may allow an extension of the deadline for defending the doctoral thesis up to a maximum of eight (8) years from enrolment.

Student activities during the study include:

- taking exams in subjects prescribed by the study programme
- participating in scientific research with the help and supervision of a mentor that results in the preparation and defence of a doctoral thesis
- presenting the results of scientific research to colleagues and at domestic and international scientific conferences
- publishing scientific papers
- staying at other domestic and foreign universities or scientific institutions, etc.

In order to increase the number of students who will successfully complete their studies and become Doctor of Science, it can be proposed to reduce the teaching load while simultaneously increasing scientific research work.

Subjects

The possibility of choosing individual subjects allows doctoral students to complete and deepen their knowledge in accordance with their scientific interests. Subjects are taken and passed at the Faculty with the possibility of choosing subjects from other components. This increases the quality of teaching, the selection of the highest quality lecturers, professors from a particular field, and significantly reduces the costs arising from the payment of lecturer fees.

Teaching is carried out in the form of lectures or seminars. In the event that fewer than five (5) students choose a subject, or if it is a part-time study, teaching is carried out in consultation.

Subjects that are carried out in the form of lectures have 30 hours of direct teaching. Teaching in seminar subjects is carried out in the form of consultations, and they are also enrolled with a fund of 30 hours of teaching. Consultations account for 20% of teaching, i.e. 20% of lectures, 20% of exercises, 20% of seminar teaching.

Subjects serve to profile knowledge for a narrower area of research. They belong to the narrower area of scientific research of the doctoral student. Within the offered Subjects, the doctoral candidate chooses a total of five (5) Subjects in the first and second semesters, of which two (2) are mandatory and three (3) are elective. Elective Subjects are Subjects chosen with the consent of the mentor in the direction of the doctoral candidate's scientific profiling. With the consent of the mentor and the Postgraduate Study Committee, the doctoral candidate may enrol in one (1) Subject from another postgraduate study programme at faculties of other universities or one (1) Subject from a constituent

part of the University of Split. In the case of cooperation between the University and other universities, with the consent of the Postgraduate Study Council, the above condition may be changed.

The doctoral student is required to pass both mandatory subjects, and from the elective subjects, choose the subject of the mentor and two more subjects in accordance with his/her scientific profile.

All subjects are aligned with the trends in the development of science and changes in scientific and research projects, with the approval of the Faculty Council. The selection of subjects is carried out by a mentor and is fully adapted to each doctoral student, with the proviso that for some subjects there are certain prerequisites, which are presented in the tables of each individual subject.

Teaching at the postgraduate study is conducted by teachers with scientific and teaching titles from the technical and biotechnical scientific fields.

Scientific research work

During their postgraduate studies, a doctoral candidate is obliged to actively conduct scientific research and publish scientific papers in the field of the doctoral thesis. A doctoral candidate is obliged to present and publish at least one scientific paper in the proceedings of a scientific conference in the field of the doctoral thesis with international peer review and to publish at least one paper in a journal with international peer review indexed in CC, SCI or SCI-Expanded, thematically related to the doctoral research, in which they are the main author.

A doctoral candidate may publish scientific papers in scientific journals that are categorized differently with respect to the scientific basis and publish papers at international scientific conferences with a mandatory certificate of participation and presentation. Published articles should be based on research work in the direction of the doctoral dissertation. The doctoral candidate's mentor writes a report on the doctoral candidate after two years of joint work. This report should be accepted by the Postgraduate Study Committee. The doctoral candidate also evaluates the mentor through a survey.

Public discussion on the topic of the doctoral thesis

Public discussion implies prior application of the doctoral thesis topic. The procedure for applying for a doctoral thesis topic is initiated by submitting a completed Doctoral Thesis Topic Application Form. The requirements for applying for a doctoral thesis topic are passing exams in all enrolled subjects, passing the qualifying doctoral exam, and the doctoral candidate must have published at least one scientific paper in the proceedings of a scientific conference with international peer review in the field of the doctoral thesis topic.

In the process of accepting the doctoral thesis topic, a public discussion is held on the expected original scientific contribution of the doctoral thesis, which assesses the expected scientific contribution and its feasibility.

Writing a doctoral thesis

The procedure for preparing and defending a doctoral thesis includes submitting the text of the doctoral thesis, evaluating the thesis and defending it in accordance with the Regulations on Postgraduate Studies.

Before submitting the doctoral thesis for evaluation, the doctoral candidate is required to have published at least one internationally peer-reviewed paper in a journal indexed in CC, SCI or SCI-E, thematically related to the doctoral research, in which he/she is the first author. The paper should be published in a journal referred to the scientific field of the doctoral research.

The general content and layout of the doctoral thesis are prescribed by special Instructions on the Content and Layout of the Doctoral Thesis. The doctoral thesis can be prepared in the form:

i. scientific monographs or
ii. in the form of a set of published scientific papers with an overview chapter.

The doctoral thesis is written in English. The thesis defence is in English before an international committee.

Points system

The teaching and scientific-research workload of the study is expressed in ECTS credits. Each subject or activity is assigned a certain number of credits that is proportional to the workload of the doctoral student. The basic principle of the ECTS system is that the minimum sum of credits for one academic year is 60, or a total of 180 ECTS credits for postgraduate studies (Table 2).

The distribution of points in connection with individual activities of doctoral students is carried out according to criteria:

- taking Subjects prescribed by the study programme at least 25 ECTS points
- publishing scientific papers in proceedings and journals and conducting scientific research resulting in the preparation and defence of a doctoral thesis 95 ECTS points
- public discussion 20 ECTS points
- defence of a doctoral dissertation 40 ECTS points.

The structure of the postgraduate study with the minimum number of Subjects and the corresponding ECTS credits is shown in the table. A doctoral student can enrol in a larger number of Subjects.

Table 2 - Content of the Postgraduate University Study Technologies in Maritime Affairs and distribution of ECTS credits

Semester	**I**	**II**	**III**	**IV**	**V**	**VI**		**ECTS points**
Study subjects	2 Mand	3 Elect.	-	-	-	-	-	**25**
Public discussion	-	-	-	1	-	-	-	**20**
Scientific research work and doctoral thesis writing	+	+	+	+	+	+	-	**95**
Doctoral thesis defence	-	-	-	-	-	-	1	**40**
Total points after defending the doctoral thesis								**180**

The evaluation of published scientific papers is done according to the following criteria:

- scientific paper in an international scientific journal from the scientific databases CC, SCI - 25 ECTS credits
- scientific paper in an international scientific journal from the scientific databases SCI-E - 20 ECTS credits
- scientific paper in an international scientific journal from the scientific database SCOPUS – 8 ECTS credits
- international conference (with a certificate of participation and presentation) – 7 ECTS credits
- research work on a scientific project – 15 ECTS credits
- research work on projects (developmental, innovative, etc.) by the EU – 10 ECTS credits (decided by the Postgraduate Study Committee)
- research on a professional paper – 4 ECTS credits.

Recognition of doctorates - Scandinavian model

A scientific work may be based on consolidated scientific papers in the form of a set of published scientific papers in the Web of Science database, which were published after enrolment in the doctoral study. A set of published scientific papers consists of 3-5 papers, of which the applicant must be the first author in 3 papers. The total IF (Impact Factor) of the published papers must not be less than 4. The scientific papers that are proposed as a doctoral thesis together must form a complete whole in the field covered by the accepted doctoral thesis topic. Each paper, unless specifically explained, can qualify only one doctoral candidate. The mandatory accompanying part of such a form of doctoral thesis is a chapter consisting of an introduction with clearly elaborated hypotheses, research methods, discussion and conclusions. A doctoral thesis submitted in this way in the form of consolidated published papers undergoes the same evaluation and defence procedure as a monograph.

2.7. Study conditions

Study conditions

The doctoral student chooses a mentor before enrolling in the postgraduate study. The mentor accepts or rejects the mentorship based on the interview of the doctoral student – the future student. After each academic year, the mentor submits a report on the doctoral students work to the Postgraduate Study Committee. The doctoral student is obliged to regularly report to the mentor on the results achieved during the activities foreseen in the study programme. The doctoral student is obliged to submit a report on his/her work to the mentor once a year. The doctoral student can enrol in the next academic year only after he/she has fulfilled all obligations from the previous academic years. Each exam can be taken four times. If the doctoral student fails to pass the exam after the 4th attempt, he/she must re-enrol for the entire academic year. If the doctoral student fails the exam after the eighth attempt, the doctoral student will be dropped (Table 3.)

The postgraduate study aims to educate scientists for innovation and finding new technical and technological solutions in industry, especially maritime. In addition, the goal is to retain the highest quality staff at higher education institutions and institutes in Croatia. Postgraduate studies should tend to better connect the industrial and educational sectors, not only in terms of joint projects but also in terms of educating quality personnel who would enable innovation and increase production.

On the other hand, industry, in cooperation with a scientific institution, would solve certain business challenges and thus directly contribute to the quality of education. The postgraduate study is based on mentoring work with doctoral students.

It will be based on the existing scientific and research projects of the Faculty, which ensures high quality teaching by competent teachers and enables an active role for students through direct involvement in various scientific topics. The postgraduate study will enable doctoral students to use the resources of the Faculty, such as scientific and teaching equipment, library funds, laboratories, simulators, etc. It will enable significant financial savings in the organization of teaching and scientific and research work. It will simplify management and improve coordination between components in relation to the postgraduate study, supervision of doctoral students' topics and their scientific contribution.

Table 3 - Actions and conditions aimed at reducing study time and increasing student success

Intervention	Measures	Intervention description	Expected outcome
Enrolment strategy	Selection criteria	The main admission criteria are a tentative research plan that includes a realistic contribution, a description of the available equipment on which the research would be conducted, and the choice of a mentor. Doctoral students have a defined research topic and mentor.	Doctoral students must define a research topic, plan, and mentor.
	Interdisciplinary approach to doctoral enrolment	Admission of students who are scientifically and research-oriented.	Building interdisciplinary research groups that work together.
Programme regulation	Doctoral student progress report	Mandatory biennial report as the main indicator of student progress.	Insight into the progress of a doctoral student.
	Strict rules for enrolment in the next academic year	A doctoral student may take each exam (including the bimonthly report) 4 times during the year. After that, they must repeat the academic year. Each year can only be repeated once. If they fail even the eighth time during the two years of attendance, doctoral students are dismissed.	Doctoral students study regularly.
Curriculum	Formal education and skills	Introduction to the study: Research skills, methodology, technology transfer, ethics in research, presentation of scientific research work. Acquiring the necessary skills for a successful research career.	Acquiring the necessary skills for a successful research career.
	Emphasis on research	Mandatory completion of a detailed research plan by the end of the first year of study.	Research plan completed by the end of the first year of study.

2.8. List of subjects that doctoral students can enrol in from other studies

Doctoral students can choose elective subjects from other doctoral studies and doctoral schools in the Republic of Croatia and abroad in accordance with the rules of the Bologna Process. The Postgraduate Study Committee and the ECTS coordinator assess the value of ECTS Subjects. A maximum of one Subject can be chosen. The chosen subjects must be in the direction of the doctoral student's scientific specialization. Permission to enrol in subjects from other studies is granted by the Postgraduate Study Council with the written consent of the mentor.

2.9. List of subjects that can be taught in a foreign language

All Subjects in the doctoral programme can be taught in English. The doctoral dissertation is written and defended in English.

2.10. Criteria and conditions for transferring ECTS credits

The Postgraduate Study Committee and the ECTS Coordinator assess the value of ECTS subjects that doctoral students can choose from other studies at the University or at other universities if it is related to the number of hours of student workload in that subject. Every 30 hours of student workload carries 1 ECTS point.

2.11. Completion of studies

The Postgraduate University Study Technologies in Maritime Affairs is completed by passing exams in all enrolled subjects, publishing prescribed scientific papers, and preparing and publicly defending a doctoral thesis. The requirements for submitting a doctoral thesis topic and submitting a doctoral thesis for assessment, as well as the procedures for assessing a doctoral thesis topic, assessing and defending a doctoral thesis, are presented in the following table.

Submitting a doctoral thesis topic	The requirements for submitting a doctoral thesis topic are as follows: • passed exams in all enrolled subjects • achieved 45 ECTS credits from scientific research work (magazines and conferences). The Faculty Council appoints the Committee for the Evaluation of the Doctoral Thesis Topic. • The Committee consists of three or five members whose scientific activity is in the field of the doctoral thesis of the doctoral candidate. • At least one member must not be an employee of a constituent of the University of Split, at least one member must not be an employee of the Faculty of Maritime Studies in Split or a postgraduate teacher. • The President of the Committee must be a postgraduate teacher elected to the title of at least associate professor in the field of the doctoral thesis. The work of the Committee is coordinated by the President of the Committee. • The doctoral candidate's mentor may be a member of the Committee, but may not be the President of the Committee. The public discussion on the expected scientific contribution of the doctoral thesis is led by the Committee for Accepting the Topic of the Doctoral Thesis.

	The Committee for Accepting the Doctoral Thesis Topic submits to the Postgraduate Studies Committee an assessment of the doctoral thesis topic with a proposal for acceptance or rejection of the thesis topic. The final decision on acceptance or rejection of the doctoral thesis topic is made by the Faculty Council upon the proposal of the Postgraduate Studies Committee.
Doctoral thesis evaluation	The requirements for submitting a doctoral thesis are as follows: • The doctoral candidate must have published at least one internationally peer-reviewed paper in a journal indexed in CC, SCI or SCI-E, thematically related to the doctoral research in which he/she is the main author, the paper must be published in a journal referred to the scientific field of the doctoral research • The doctoral candidate is obliged to present and publish at least one paper in the proceedings of an international scientific conference, thematically related to the doctoral research. The Faculty Council appoints the Doctoral Thesis Evaluation Committee and the Doctoral Thesis Defence Committee. • The Committee consists of five members whose scientific activity is in the scientific field of the candidate's doctoral thesis. • At least one member must not be an employee of the University of Split, at least one member must not be an employee of the Faculty of Maritime Studies in Split or a teacher of the University postgraduate study of Maritime Technology. • At least one member must be from one of the other EU countries and deal with the field of the doctoral thesis topic. • The President of the Committee must be a lecturer of the Faculty's postgraduate study elected to the rank of at least associate professor in the field of the doctoral thesis topic. The work of the Committee is coordinated by the President of the Committee. • The doctoral candidate's mentor cannot be a member of the Committee. • The Committee for the defence of the doctoral thesis can have the same composition as the Committee for the evaluation of the work. The text of the doctoral thesis is published on the Faculty's website. The Doctoral Thesis Evaluation Committee submits the doctoral thesis evaluation to the Postgraduate Study Council. The final decision on the doctoral thesis evaluation is made by the Faculty Council upon the proposal of the Postgraduate Study Council.
Doctoral thesis defence	• The doctoral thesis is defended before the Doctoral Thesis Defence Committee. • The members of the Defence Committee may be the same as those of the Doctoral Thesis Evaluation Committee. • If the Defence Committee is elected, it is elected in the same manner and under the same conditions as the Doctoral Thesis Evaluation Committee. • The doctoral candidate may defend the doctoral thesis no later than two months after the Faculty Council accepts the positive evaluation of the doctoral thesis. • The defence of the doctoral thesis is public. The Doctoral Thesis Defence Committee issues an evaluation after the defence. • The defence evaluation is entered in the minutes, which are signed by all members of the Committee. • The doctoral thesis is defended only once.

2.12. List of mandatory subjects

LIST OF SUBJECTS							
Year: 1							
Semester: 1							
STATUS	CODE	SUBJECT	HOURS PER SEMESTER				ECTS
			L	S	E	F	
Mandatory	DS01	Scientific research methodology	20	10			5
	DS02	Organization of scientific projects and bibliometrics	18	2	10		5
	Total required		40	20			10

L - Lectures
S - Seminars/workshops
E - Exercises
F - Field work

2.13. Description of mandatory subjects

<table>
<tr><td>SUBJECT NAME</td><td colspan="5">Scientific research methodology</td></tr>
<tr><td>Code</td><td>DS01</td><td>Year of study</td><td colspan="3">1</td></tr>
<tr><td>Subject holder/s</td><td>Full Prof. Alen Soldo,
Asst. Prof. Hrvoje Dodig</td><td>Point value (ECTS)</td><td colspan="3">5</td></tr>
<tr><td rowspan="2">Collaborators</td><td rowspan="2"></td><td rowspan="2">Teaching method (hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>20</td><td>10</td><td>0</td><td>0</td></tr>
<tr><td>Subject status</td><td>Mandatory</td><td>Percentage of e-learning</td><td colspan="3"></td></tr>
<tr><td colspan="6">SUBJECT DESCRIPTION</td></tr>
<tr><td>Subject objectives</td><td colspan="5">Doctoral students will learn about various scientific methods. They will be able to choose a suitable scientific method for researching a particular problem. Familiarization with the method of reviewing scientific articles. Analysing ethics in writing scientific articles. Getting to know different ways of citing. Analysis of plagiarism detection software.</td></tr>
<tr><td>Subject enrolment requirements and entry competencies required for the</td><td colspan="5">Completed graduate university studies.</td></tr>
<tr><td>Expected learning outcomes at the subject level (4-10 learning outcomes)</td><td colspan="5">After successfully completing the subject, doctoral students will be able to:
1. Independently use citations and references correctly
2. Critically analyse methods of plagiarism
3. Independently assess the quality of a scientific article
4. Independently conduct a review
5. Combine plagiarism detection programmes</td></tr>
<tr><td>The subject content is elaborated in detail according to the class schedule</td><td colspan="5">Lectures
1. Research methods (2 hours)
2. Citation and referencing methods (1 hour)
3. Writing styles (1 hour)
4. Writing ethics (1 hour)
5. The concept of plagiarism and computer programmes for detecting plagiarism (2 hours)
6. Writing a scientific article: selection of literature, content of a scientific article (1 hour)
7. Selecting a journal for searching articles (1 hour)
8. Preparing an article according to the instructions for authors (1 hour)
9. Assessing the value of a scientific article (1 hour)
10. Review (1 hour)
11. Working in electronic journal systems for sending articles (2 hours)
12. Communication with the journal editorial board (2 hours)
13. Procedure after acceptance of an article (1 hour)
14. End Note computer programme for managing references (1 hour)
15. Article evaluation (original scientific, review, preliminary announcement, professional paper) (1 hour)
16. Using a plagiarism detection programme (1 hour)
Seminars
1. Examples of plagiarism (databases, methods of detection, types) (2 hours)
2. Critical attitude towards a scientific article (2 hours)</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">3. Bibliographic data search (2 hours)
4. Poster creation (2 hours)
5. Presentation creation (2 hours)</td></tr>
<tr><td>Types of teaching</td><td colspan="3">☒ lectures
☒seminars and workshops
□ exercises
□ complete online
□ mixed e-learning
□ fieldwork</td><td colspan="3">□ independent tasks
□ multimedia
□ laboratory
□ mentoring work
□ (other, write in)</td></tr>
<tr><td>Student obligations</td><td colspan="6"></td></tr>
<tr><td rowspan="5">Monitoring student work (enter the share in ECTS points for each activity so that the total number of ECTS points corresponds to the subject credit value)</td><td>Attending classes</td><td>1</td><td>Research</td><td>1</td><td>Practical work</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(other, write in)</td><td></td></tr>
<tr><td>Essays</td><td>1</td><td>Seminar paper</td><td>1</td><td>(other, write in)</td><td></td></tr>
<tr><td>Colloquia</td><td></td><td>Oral exam</td><td>1</td><td>(other, write in)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(other, write in)</td><td></td></tr>
<tr><td>Grading and evaluating student work during classes and at the final exam</td><td colspan="6">The doctoral candidate is required to attend lectures, seminars and exercises, and to participate independently and defend the seminar paper. The doctoral candidate is assessed orally.</td></tr>
<tr><td rowspan="4">Required literature (available in the library and through other media)</td><td colspan="3">Title</td><td>Number of copies</td><td>Availability through other media</td></tr>
<tr><td colspan="3">Zelenika, R. Metodologija i tehnologija izrade znanstvenog i stručnog djela, Ekonomski fakultet Sveučilišta u Rijeci, 1999.</td><td></td><td></td></tr>
<tr><td colspan="3">Žugaj, M. Metodologija znanstveno istraživačkog rada, FOI, Varaždin, 1997.</td><td></td><td></td></tr>
<tr><td colspan="3">Databases of scientific and professional papers available on the Internet</td><td></td><td></td></tr>
<tr><td>Supplemental literature</td><td colspan="6">1. Markel, Mike: Writing in the Technical Fields, IEEE Press, 1994.
2. Thorsten, Ewald: Writing in the Technical Fields: A Practical Guide, Oxford University Press, 2014</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of established learning outcomes</td><td colspan="6"></td></tr>
<tr><td>Other (according to the proposer's opinion)</td><td colspan="6"></td></tr>
</table>

<table>
<tr><td>SUBJECT NAME</td><td colspan="5">Organization of scientific projects and bibliometrics</td></tr>
<tr><td>Code</td><td>DS02</td><td>Year of study</td><td colspan="3">1</td></tr>
<tr><td>Subject holder/s</td><td>Full Prof. Alen Soldo,
Asst. Prof. Hrvoje Dodig</td><td>Point value (ECTS)</td><td colspan="3">5</td></tr>
<tr><td rowspan="2">Collaborators</td><td rowspan="2"></td><td rowspan="2">Teaching method (hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>18</td><td>2</td><td>10</td><td>0</td></tr>
<tr><td>Subject status</td><td>mandatory</td><td>Percentage of e-learning</td><td colspan="3"></td></tr>
<tr><td colspan="6">SUBJECT DESCRIPTION</td></tr>
<tr><td>Subject objectives</td><td colspan="5">Doctoral students will be able to independently design a project, from the basic idea to writing an application. They will be introduced to the design of quality hypotheses and the methods of possible proofs. They will be introduced to the methods of database searches and bibliometrics of journals and the methods of searching and comparing journal features. Doctoral students will learn the functioning of the editorial board of scientific journals and conferences.</td></tr>
<tr><td>Subject enrolment requirements and entry competencies</td><td colspan="5">Completed graduate university studies.</td></tr>
<tr><td>Expected learning outcomes at the subject level (4-10 learning outcomes)</td><td colspan="5">After successfully completing the subject, doctoral students will be able to:
1. Independently design a project from idea to application
2. Critically judge and formulate a hypothesis
3. Independently search scientific databases
4. Independently search and evaluate journal metrics
5. Analyse the work of journals and conferences</td></tr>
<tr><td>The subject content is elaborated in detail according to the class schedule</td><td colspan="5">Lectures
1. Writing successful projects in the technical field (presentation of the meaning and importance of the project, explanation of general principles of proposal writing, organization of time and resources, division of tasks, problems, obstacles) (4 hours)
2. From idea to title and summary (1 hour)
3. Elaboration of the mortgage and assumptions (1 hour)
4. Procedures, protocols, plans (1 hour)
5. Goals and expected results (1 hour)
6. Basic features of the database (1 hour)
7. Types of database and their overview (1 hour)
8. Bibliometrics (term of base, term of citation, IF) (1 hour)
9. Boolean operators (1 hour)
10. Web of Science (1 hour)
11. Scopus (1 hour)
12. Organization of the magazine (1 hour)
13. Organization of conferences (1 hour)
Seminars
1. Project preparation</td></tr>
<tr><td>Types of teaching</td><td colspan="2">☒ lectures
☒seminars and workshops
□ exercises
□ on line in full
□ mixed e-learning
□ fieldwork</td><td colspan="3">□ independent tasks
□ multimedia
□ laboratory
□ mentoring work
☐ (other, write in)</td></tr>
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<tr><td>Student obligations</td><td colspan="6"></td></tr>
<tr><td rowspan="5">Monitoring student work (enter the share in ECTS points for each activity so that the total number of ECTS points corresponds to the subject credit value)</td><td>Attending classes</td><td>1</td><td>Research</td><td>1</td><td>Practical work</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(other, write in)</td><td></td></tr>
<tr><td>Essays</td><td>1</td><td>Seminar paper</td><td>1</td><td>(other, write in)</td><td></td></tr>
<tr><td>Colloquia</td><td></td><td>Oral exam</td><td>1</td><td>(other, write in)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(other, write in)</td><td></td></tr>
<tr><td>Grading and evaluating student work during classes and at the final</td><td colspan="6">The doctoral candidate is required to attend lectures, seminars and exercises, and to participate independently and defend the seminar paper. The doctoral candidate is assessed orally.</td></tr>
<tr><td rowspan="8">Required literature (available in the library and through other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability through other media</td></tr>
<tr><td colspan="3">Žugaj, M. Metodologija znanstveno istraživačkog rada, FOI, Varaždin, 1997.</td><td></td><td></td></tr>
<tr><td colspan="3">Databases of scientific and professional papers available on the Internet</td><td></td><td></td></tr>
<tr><td colspan="3"></td><td></td><td></td></tr>
<tr><td colspan="3"></td><td></td><td></td></tr>
<tr><td colspan="3"></td><td></td><td></td></tr>
<tr><td colspan="3"></td><td></td><td></td></tr>
<tr><td colspan="3"></td><td></td><td></td></tr>
<tr><td>Supplemental literature</td><td colspan="6">1. Markel, M.: Writing in the Technical Fields, IEEE Press, 1994.
2. Thorsten, E.: Writing in the Technical Fields: A Practical Guide, Oxford University Press, 2014</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of established</td><td colspan="6"></td></tr>
<tr><td>Other (according to the proposer's opinion)</td><td colspan="6"></td></tr>
</table>

2.14. List of elective subjects

LIST OF SUBJECTS							
Year: 1							
Semester: 1 and 2							
STATUS	CODE	SUBJECT	HRS. PER SEMESTER				ECTS
			L	S	E	F	
Elective subjects	DS03	Maritime expert systems	20	10	0	0	5
	DS04	Intelligent transport systems in maritime studies	15	15	0	0	5
	DS05	Strength and vibration of marine propulsion systems	20	10	0	0	5
	DS06	Modelling and simulation of marine propulsion systems	20	0	0	0	5
	DS07	Energy efficiency of marine systems	20	10	0	0	5
	DS08	Technical supervision of sea-going vessels	20	0	0	0	5
	DS09	Mathematical methods in maritime studies	12	10	8	0	5
	DS10	Modelling and optimization of maritime transport systems	25	0	5	0	5
	DS11	Energy efficiency in maritime transport	20	5	5	0	5
	DS12	Advanced algorithms in traffic monitoring systems	20	10	0	0	5
	DS13	Sustainable maritime transport system from the aspect of ecology and environmental protection	20	10	0	0	5
	DS14	Forensic hydrography, modelling and simulation	20	10	0	0	5
	DS15	Synthesis of control systems in high-risk sea areas	25	0	5	0	5
	DS16	Methodology of maritime operations design	20	0	0	0	5
	DS17	Maritime route planning	15	15	0	0	5

2.15. Description of elective subjects for the module Maritime affairs

SUBJECT NAME	Maritime expert systems					
Code	DS03	Year of study	1			
Subject holder/s	Asst. Prof. Hrvoje Dodig	Point value (ECTS)	5			
Collaborators		Teaching method (hours per semester)	L	S	E	F
			20	10	0	0
Subject status	Elective	Percentage of e-learning				
SUBJECT DESCRIPTION						
Subject objectives	Introduction to expert systems in maritime and acquisition of knowledge for application and development of expert systems in maritime. Design of expert systems for navigation using fuzzy logic. Fuzzy logic in autopilots and collision avoidance at sea.					

	Fuzzy logic when positioning the ship. DSS (Decision Support System) and CBR (Case Based Reasoning) expert systems and application for marine autopilot. Neural networks and application in ship expert systems: rudder control, ship motion modelling, automatic ship mooring systems. Belief networks and Dempster-Shafter theory.
Subject enrolment requirements and entry competencies required for the	Completed graduate university studies.
Expected learning outcomes at the subject level (4-10 learning outcomes)	After successfully completing the subject, doctoral students will be able to: 1. Present the architecture of an expert system and its components: knowledge bases, reasoning, inference. 2. Interpret the operation of a DSS and CBR expert system and design and simulate a marine CBR autopilot system. 3. Design and simulate a marine expert system based on fuzzy logic. 4. Simulate and design a marine collision avoidance system based on fuzzy logic. 5. Design and simulate a marine expert system based on neural networks. 6. Combine different inference methods and apply the most appropriate method to a maritime problem.
The subject content is elaborated in detail according to the class schedule	**Lectures** 1. Introduction: Artificial Intelligence and Expert Systems (2 hours) 2. Expert System Architecture (1 hour) 3. Knowledge Bases and Knowledge Representation (1 hour) 4. Reasoning and Inference (1 hour) 5. DSS and CBR - Expert Decision Support Systems (1 hour) 6. Application of CBR Expert System in Ship Autopilot (1 hour) 7. Fuzzy Logic (1 hour) 8. Fuzzy Logic in Expert Systems (2 hours) 9. Application of Fuzzy Logic Systems in Expert Systems on Ships 10. Analysis of a Collision Avoidance System at Sea Based on Fuzzy Logic (2 hours) 11. Neural Networks (2 hours) 12. Neural Networks as a Part of Expert Systems (1 hour) 13. Application of Neural Networks in Automatic Ship Mooring Systems (2 hours) 14. Belief Networks and Dempster-Shafter Theory (1 hour) 15. Other Expert Systems in Traffic and Transport (1 hour) **Seminars** 1. DSS and CBR expert systems (2 hours) 2. Fuzzy logic and application in maritime (2 hours) 3. Neural networks and application in maritime transport (2 hours) 4. Application of the Dempster-Shafter theory (2 hours) 5. Neural networks in transport (2 hours)
Types of teaching	☒ lectures ☒seminars and workshops □ exercises □ on line in full □ mixed e-learning □ fieldwork □ independent tasks □ multimedia □ laboratory □ mentoring work □ (other, write in)

<table>
<tr><td>Student obligations</td><td colspan="6"></td></tr>
<tr><td rowspan="5">Monitoring student work (enter the share in ECTS points for each activity so that the total number of ECTS points corresponds to the subject credit value)</td><td>Attending classes</td><td>1</td><td>Research</td><td>1</td><td>Practical work</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(other, write in)</td><td></td></tr>
<tr><td>Essays</td><td>1.75</td><td>Seminar paper</td><td>0.25</td><td>(other, write in)</td><td></td></tr>
<tr><td>Colloquia</td><td></td><td>Oral exam</td><td>1</td><td>(other, write in)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(other, write in)</td><td></td></tr>
<tr><td>Grading and evaluating student work during classes and at the final exam</td><td colspan="6">The doctoral candidate is required to attend lectures, seminars and exercises, participate independently and defend the seminar paper. The doctoral candidate is assessed daily by oral exam.</td></tr>
<tr><td rowspan="5">Required literature (available in the library and through other media)</td><td colspan="3">Title</td><td>Copies in the library</td><td>Availability through other media</td></tr>
<tr><td colspan="3">Giarratano and J. Riley, Expert Systems: Principles and Programing, PWS Publishing Company, Boston, 1994</td><td></td><td></td></tr>
<tr><td colspan="3">P. Jackson, Introduction to Expert Systems, Addisson-Wesley Publications, New York, 1999</td><td></td><td></td></tr>
<tr><td colspan="3">Dr. K. Uma Rao, Artificial Intelligence and Neural Networks, Pearson, 2011</td><td></td><td></td></tr>
<tr><td colspan="3">T.J. Ross, Fuzzy Logic with Engineering Applications, 3rd ed, Wiley, 2011</td><td></td><td></td></tr>
<tr><td>Supplemental literature</td><td colspan="6">G. Shafer, Mathematical Theory of Evidence, Princeton University Press, 1976</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of established learning outcomes</td><td colspan="6">• Evaluation of results in accordance with the specified learning outcomes
• Feedback from students through a student survey
• Teacher self-evaluation
• Institutional and extra-institutional checks</td></tr>
<tr><td>Other (according to the proposer's opinion)</td><td colspan="6"></td></tr>
</table>

<table>
<tr><td>SUBJECT NAME</td><td colspan="5">Intelligent transport systems in maritime studies</td></tr>
<tr><td>Code</td><td>DS04</td><td>Year of study</td><td colspan="3">1</td></tr>
<tr><td>Subject holder/s</td><td>Assoc. Prof. Pero Vidan</td><td>Point value (ECTS)</td><td colspan="3">5</td></tr>
<tr><td rowspan="2">Collaborators</td><td rowspan="2"></td><td rowspan="2">Teaching method (hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>15</td><td>15</td><td>0</td><td>0</td></tr>
<tr><td>Subject status</td><td>Elective</td><td>Percentage of e-learning</td><td colspan="3"></td></tr>
<tr><td colspan="6">SUBJECT DESCRIPTION</td></tr>
<tr><td>Subject objectives</td><td colspan="5">Analysing ship management systems from the perspective of intelligent technologies. Critical thinking towards new advanced management systems. Comparative analysis of possible IT systems. Directing thinking towards innovations of new technologies for the purpose of obtaining reliable autonomous ships.</td></tr>
<tr><td>Subject enrolment requirements and entry competencies required for the</td><td colspan="5">Completed graduate university studies in a technical field.</td></tr>
<tr><td>Expected learning outcomes at the subject level (4-10 learning outcomes)</td><td colspan="5">After successfully completing the subject, doctoral students will be able to:
1. Independently search and analyse scientific literature in the field of intelligent technologies.
2. Write and present a review paper on modern technological solutions in the field of design and analysis of intelligent systems in the maritime sector.
3. Critically assess the features of new methods of design and analysis of intelligent transport systems.
4. Propose optimal solutions in the design and engineering of intelligent systems.</td></tr>
<tr><td>The subject content is elaborated in detail according to the class schedule</td><td colspan="5">Lectures
1. The concept of intelligence in traffic (3 hours)
2. Analysis of electronic navigation devices SOLAS (2 hours)
3. Comparative analysis of elements of an integrated navigation system (3 hours)
4. Integrated ship system - analysis, legal regulations (2 hours)
5. Automation of the bridge and engine room (SOLAS) (1 hour)
6. Analysis of the reporting system (2 hours)
7. E-navigation, concept, legal regulations (2 hours)
Seminars
1. Ship management models (2 hours)
2. E-navigation systems in the world (2 hours)
3. Meteorological data processing (2 hours)
4. ITS simulation on board (1 hour)
5. Human error in ITS (1 hour)
6. Advanced systems in e-navigation (2 hours)
7. Unmanned ship (1 hour)
8. Telemetry in maritime transport (2 hours)
9. Ergonomics and design (2 hours)</td></tr>
<tr><td>Types of teaching</td><td colspan="2">☒ lectures
☒seminars and workshops
□ exercises
□ on line in full
□ mixed e-learning
□ fieldwork</td><td colspan="3">□ independent tasks
□ multimedia
□ laboratory
□ mentoring work
□ (other, write in)</td></tr>
<tr><td>Student obligations</td><td colspan="5"></td></tr>
</table>

<table>
<tr><td rowspan="5">Monitoring student work (enter the share in ECTS points for each activity so that the total number of ECTS points corresponds to the subject credit value)</td><td>Attending classes</td><td>1</td><td>Research</td><td>1</td><td>Practical work</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(other, write in)</td><td></td></tr>
<tr><td>Essays</td><td>1</td><td>Seminar paper</td><td>1</td><td>(other, write in)</td><td></td></tr>
<tr><td>Colloquia</td><td></td><td>Oral exam</td><td>1</td><td>(other, write in)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(other, write in)</td><td></td></tr>
<tr><td>Grading and evaluating student work during classes and at the final exam</td><td colspan="6">The doctoral candidate is required to attend lectures, seminars and exercises, participate independently and defend the seminar paper. The doctoral candidate is assessed by oral exam.</td></tr>
<tr><td rowspan="3">Required literature (available in the library and through other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability through other media</td></tr>
<tr><td colspan="3">www.imo.org</td><td></td><td>x</td></tr>
<tr><td colspan="3">www.unmanned-ship.org/munin/about/the-autonomus-ship/</td><td></td><td>x</td></tr>
<tr><td>Supplemental literature</td><td colspan="6"></td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of established learning outcomes</td><td colspan="6">• Evaluation of results in accordance with the specified learning outcomes
• Feedback from students through a student survey
• Teacher self-evaluation
• Institutional and extra-institutional checks</td></tr>
<tr><td>Other (according to the proposer's opinion)</td><td colspan="6"></td></tr>
</table>

<table>
<tr><td>SUBJECT NAME</td><td colspan="5">Strength and vibrations of marine propulsion systems</td></tr>
<tr><td>Code</td><td>DS05</td><td>Year of study</td><td colspan="3">1</td></tr>
<tr><td>Subject holder/s</td><td>Full Prof. Nenad Vulić</td><td>Point value (ECTS)</td><td colspan="3">5</td></tr>
<tr><td rowspan="2">Collaborators</td><td rowspan="2"></td><td rowspan="2">Teaching method (hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>20</td><td>10</td><td>0</td><td>0</td></tr>
<tr><td>Subject status</td><td>Elective</td><td>Percentage of e-learning</td><td colspan="3"></td></tr>
<tr><td colspan="6">SUBJECT DESCRIPTION</td></tr>
<tr><td>Subject objectives</td><td colspan="5">Master the advanced techniques of calculating and verifying the strength and vibrations of the ship's propulsion system as a mechanical assembly, which include the structural form, dimensions, choice of materials, determination of the driving load, as well as the calculation of displacements, speeds, accelerations, critical frequencies, internal forces, deformations, stresses, permissible stresses and safety factors in the time and frequency domain.</td></tr>
<tr><td>Subject enrolment requirements and entry competencies required for the</td><td colspan="5">Completed undergraduate studies in the scientific field of technical sciences, which includes subjects in mechanics of deformable solids (strength).</td></tr>
<tr><td>Expected learning outcomes at the subject level (4-10 learning outcomes)</td><td colspan="5">After successfully completing the subject, doctoral students will be able to:
1. Independently search and analyse scientific literature in the field of mechanical behaviour of ship propulsion systems.
2. Write and present a review paper on the centration (alignment) of the propeller shaft, and/or on its torsion, longitudinal, bending or precession vibrations.
3. Critically assess the characteristics of new methods of design and analysis of the mechanical characteristics of ship propeller shafts.
4. Propose rational solutions in the design and engineering of ship propulsion systems, using modern simulation programmes.
5. Independently verify and validate the proposed solutions.</td></tr>
<tr><td>The subject content is elaborated in detail according to the class schedule</td><td colspan="5">Lectures
1. Selection of the concept of the ship's propulsion system and the structural shape of its elements
2. Selection of the material of the ship's propulsion system elements
3. Dimensioning from the point of view of the nominal torque
4. Dimensioning from the point of view of the vibration moment
5. Loading of the ship's propulsion system elements at rest
6. Propulsion load
7. Calculation, documentation and technology of the propeller shaft centring
8. Verification of the criteria for calculating the propeller shaft centring
9. Validation of the centre calculation by measuring on board
10. Simulation of torsion vibrations of the propeller shaft using the SimulationX and/or ShaftDesigner programmes
11. Calculation of longitudinal vibrations of the propeller shaft
12. Calculation of flexural and precession vibrations of the propeller shaft
Seminar
Seminar paper</td></tr>
<tr><td>Types of teaching</td><td colspan="3">☒ lectures
☒ seminars and workshops
□ exercises
□ on line in full
□ mixed e-learning
☒ fieldwork</td><td colspan="2">□ independent tasks
□ multimedia
□ laboratory
☒ mentoring work
□ (other, write in)</td></tr>
<tr><td>Student obligations</td><td colspan="5"></td></tr>
</table>

Monitoring student work (enter the share in ECTS points for each activity so that the total number of ECTS points corresponds to the subject credit value)	Attending classes	1	Research	1	Practical work	
	Experimental work		Report		(other, write in)	
	Essays	1	Seminar paper	1	(other, write in)	
	Colloquia		Oral exam	1	(other, write in)	
	Written exam		Project		(other, write in)	

Grading and evaluating student work during classes and at the final exam	The doctoral student is required to attend lectures, participate independently, and defend a seminar paper. The doctoral student is assessed orally.

	Title	Number of copies	Availability through other media
Required literature (available in the library and through other media)	*Guide for Enhanced Shaft Alignment*, American Bureau of Shipping, Houston, 2016.		internet
	…, *Guidance Notes on Propulsion Shafting Alignment*, American Bureau of Shipping, Houston, 2014.		internet
	…, *Calculation of shafts in marine applications*, Edition 2015-12, DNV GL class guidelines (CG), Høvik, 2015.		internet
	…, *Guidelines on Shafting Alignment*, Nippon Kaiji Kyokai, Tokyo, 2006.		internet
	BS ISO 20283-4:2012 +A1:2014, *Mechanical vibration - Measurement of vibration on ships - Part 4: Measurement and evaluation of vibration of the ship propulsion machinery*, British Standards Institution, London, 2014.		
	VDI 2039:2016-06 / Corr. 2016-08, *Torsional vibration of drivelines - Calculation, measurement, reduction*, Verein Deutscher Ingenieure e.V., Düsseldorf, 2016.		

Supplemental literature	…, *FKM Guideline: Analytical Strength Assessment of Components, Made of Steel, Cast Iron and Aluminum Materials in Mechanical Engineering* (6th Edition), VDMA Verband Deutscher Maschinen- und Anlagenbau, Berlin, 2012.
Quality assurance methods that ensure the acquisition of established learning outcomes	• Evaluation of results in accordance with the specified learning outcomes • Student feedback via survey • Teacher self-evaluation • Institutional and extra-institutional checks
Other (according to the proposer's opinion)	

<table>
<tr><td>SUBJECT NAME</td><td colspan="6">Modelling and simulation of marine propulsion systems</td></tr>
<tr><td>Code</td><td>DS06</td><td>Year of study</td><td colspan="4">1</td></tr>
<tr><td>Subject holder/s</td><td>Assoc. Prof. Nikola Račić</td><td>Point value (ECTS)</td><td colspan="4">5</td></tr>
<tr><td rowspan="2">Collaborators</td><td rowspan="2"></td><td rowspan="2">Teaching method (hours per semester)</td><td>L</td><td>S</td><td>AV</td><td>LV</td><td>KV</td></tr>
<tr><td>20</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Subject status</td><td>Elective</td><td>Percentage of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="7">SUBJECT DESCRIPTION</td></tr>
<tr><td>Subject objectives</td><td colspan="6">• deepening knowledge of modelling using examples of mathematical and simulation models of ship propulsion systems
• creating simulation models of ship propulsion system elements
• preparing for research, development and optimization of ship propulsion</td></tr>
<tr><td>Subject enrolment requirements and entry competencies required for the</td><td colspan="6">Completed graduate university studies in mechanical engineering, naval architecture, and marine engineering.</td></tr>
<tr><td>Expected learning outcomes at the subject level (4-10 learning outcomes)</td><td colspan="6">After successfully completing the subject, doctoral students will be able to:
1. Independently search and analyse scientific literature in the field of modelling and simulation of ship propulsion system elements.
2. Apply appropriate mathematical, physical and scientific principles in the research and development of new ideas in the research area.
3. Write and present a review paper on technological solutions researched on the developed model.
4. Critically assess the features of new technologies for collecting relevant parameters of technical systems for optimizing operation.
5. Propose a solution for optimal system operation.
6. Evaluate new methods, tools and instruments in the field of modelling and simulation of ship propulsion systems.</td></tr>
<tr><td>The subject content is elaborated in detail according to the class schedule</td><td colspan="6">• Goals and tasks of mathematical modelling and simulation of processes in ship propulsion systems
• Mathematical models of thermodynamic processes in ship propulsion engines (slow-speed DM, medium-speed DM, gas turbine, steam turbine)
• Modelling of diesel electric propulsion plant
• Propulsor modelling
• Shaft line modelling
• Jet propulsion system modelling
• Modelling (coding) of models in the Matlab – SIMULINK programing language
• Model validity testing
• Application of simulation models for analysis of operating parameters under various external influences and research on improvement of the control system</td></tr>
<tr><td>Types of teaching</td><td colspan="3">☒ lectures
☒ seminars and workshops
☒ exercises
□ on line in full
□ mixed e-learning
□ fieldwork</td><td colspan="3">☒ independent tasks
□ multimedia
☒ laboratory
☒ mentoring work
□ (other, write in)</td></tr>
<tr><td>Student obligations</td><td colspan="6">Active participation in all forms of teaching: lectures, consultations, literature searches, independent work on modelling the assigned problem.</td></tr>
<tr><td>Monitoring student work</td><td>Attending classes</td><td>1,5</td><td>Research</td><td>1,5</td><td>Practical work</td><td>1,5</td></tr>
</table>

<table>
<tr><td rowspan="4">(enter the share in ECTS points for each activity so that the total number of ECTS points corresponds to the subject credit value)</td><td>Experimental work</td><td></td><td>Report</td><td></td><td>(other, write in)</td><td></td></tr>
<tr><td>Essays</td><td></td><td>Seminar paper</td><td>1,5</td><td>(other, write in)</td><td></td></tr>
<tr><td>Colloquia</td><td></td><td>Oral exam</td><td></td><td>(other, write in)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(other, write in)</td><td></td></tr>
<tr><td>Grading and evaluating student work during classes and at the final</td><td colspan="6">The grade is determined as the mean value:
• evaluation of the quality of the written review paper
• evaluation of its oral presentation and
• evaluation of the results of the simulation of the given problem.</td></tr>
<tr><td rowspan="5">Required literature (available in the library and through other media)</td><td colspan="3">Title</td><td>Number of copies</td><td colspan="2">Availability through other media</td></tr>
<tr><td colspan="3">Martelli M.: Marine Propulsion Simulation, De Gruyter, Warsaw, 2014.</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="3">Heywood John B.: Internal Combustion Engine Fundamentals, McGraw-Hill, Singapore, 2002.</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="3">Weber J.: Optimization Methods for the Mixture Formation and Combustion process in Diesel Engines, CUVILLIER VERLAG, Gottingen, 2008.</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="3">Xiros N.: Robust Control of Diesel Ship Propulsion, Springer-Verlag London Limited, 2002.</td><td></td><td colspan="2"></td></tr>
<tr><td>Supplemental literature</td><td colspan="6">1. Račić, N.: Simulacija rada brodskog propulzijskog sustava sa sporohodnim dizelskim motorom u otežanim uvjetima, PhD Thesis (in Croatian), University of Rijeka 2008.
2. Radica, G., Antonić, R., Račić, N.: Engine Working Cycle Analysis for Diagnostic and Optimisation Purposes, Brodogradnja, Zagreb, 4 (2009), 378-387.
3. Medica, V., Račić, N., Radica, G.: Performance Simulation of Marine Slow-Speed Diesel Propulsion Engine with Turbocharger Under Aggravated Conditions, Strojarstvo, Zagreb, 51 (2009), 199-212.
4. Abusoglu, A., Kanoglu, M.: First and second law analysis of diesel engine powered cogeneration systems, Energy Conversion and Menagement 49 (2008) p. 2026-2031.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of established learning outcomes</td><td colspan="6">• Evaluation of results in accordance with the specified learning outcomes
• Feedback from students through a survey
• Teacher self-evaluation
• Institutional and extra-institutional checks</td></tr>
<tr><td>Other (according to the proposer's opinion)</td><td colspan="6"></td></tr>
</table>

SUBJECT NAME	Energy efficiency of marine systems					
Code	DS07	Year of study	1			
Subject holder/s	Asst. Prof. Zdeslav Jurić	Point value (ECTS)	5			
Collaborators		Teaching method (hours per semester)	L	S	E	F
			20	10	0	0
Subject status	Elective	Percentage of e-learning				
SUBJECT DESCRIPTION						
Subject objectives	Analysing ship systems and devices from the aspect of increasing their exergy efficiency. Directing thinking towards the use of renewable energy sources and the use and design of systems (with a higher overall efficiency) in order to reduce the use of fossil fuels and environmental pollution caused by their use. Responsible use of energy in everyday life. Selecting relevant parameters when assessing system efficiency with respect to the Second Law of Thermodynamics (exergy/entropy analysis). Determining the interaction of individual systems and devices and assessing and proposing measures to increase the energy efficiency of the ship's energy system.					
Subject enrolment requirements and entry competencies required for the	Completed graduate university studies in a technical field, mechanical engineering, naval engineering, naval architecture or related studies.					
Expected learning outcomes at the subject level (4-10 learning outcomes)	After successfully completing the subject, doctoral students will be able to: 1. Independently search and analyse scientific literature in the field of energy aspects of a ship or vessel. 2. Select relevant parameters for assessing energy efficiency. 3. Assess energy efficiency. 4. Confirm or reject and rank measures to increase energy efficiency. 5. Recommend measures to increase the energy efficiency of ship energy devices and systems.					
The subject content is elaborated in detail according to the class schedule	**Lectures** 1. Energy efficiency of the system with respect to the First and Second Laws of Thermodynamics: advantages, disadvantages and differences. Irreversibility and losses. 2. Specific features of ship energy systems with respect to stationary energy systems. Use of fossil and renewable energy sources. 3. Renewable energy sources, use and possibilities of their use on vessels. 4. Working power and losses. Selection of the system boundary. Thermal validity. 5. Energy sources and consumers on vessels: exergy analysis of a selected ship device. 6. Energy sources and consumers on vessels: exergy analysis of a selected ship system. 7. Example: calculation of the thermal validity of a process. 8. Operating modes of ship energy devices and systems (underway, at berth and at anchor). 9. Measures to increase the exergy efficiency of ship systems. 10. Impact of energy efficiency measures on navigation safety. **Seminars** 1. Energy efficiency analysis of selected marine machinery 2. Energy efficiency analysis of selected marine machinery 3. Energy efficiency analysis of selected marine machinery system 4. Energy efficiency analysis of selected marine machinery system 5. Energy efficiency analysis of selected marine machinery system					

<table>
<tr><td>Types of teaching</td><td colspan="3">☒ lectures
☒seminars and workshops
□ exercises
□ on line in full
□ mixed e-learning
□ fieldwork</td><td colspan="3">□ independent tasks
□ multimedia
□ laboratory
□ mentoring work
□ (other, write in)</td></tr>
<tr><td>Student obligations</td><td colspan="6"></td></tr>
<tr><td rowspan="5">Monitoring student work (enter the share in ECTS points for each activity so that the total number of ECTS points corresponds to the subject credit value)</td><td>Attending classes</td><td>1</td><td>Research</td><td>1</td><td>Practical work</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(other, write in)</td><td></td></tr>
<tr><td>Essays</td><td>1</td><td>Seminar paper</td><td>1</td><td>(other, write in)</td><td></td></tr>
<tr><td>Colloquia</td><td></td><td>Oral exam</td><td>1</td><td>(other, write in)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(other, write in)</td><td></td></tr>
<tr><td>Grading and evaluating student work during classes and at the final exam</td><td colspan="6">The doctoral candidate is required to attend lectures, seminars and exercises, participate independently and defend the seminar paper.
The doctoral candidate is assessed orally.</td></tr>
<tr><td rowspan="4">Required literature (available in the library and through other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability through other media</td></tr>
<tr><td colspan="3">Bošnjaković F., Nauka o toplini I, Tehnička knjiga, Zagreb</td><td></td><td></td></tr>
<tr><td colspan="3">Bošnjaković F., Nauka o toplini II, Tehnička knjiga, Zagreb</td><td></td><td></td></tr>
<tr><td colspan="3">Bošnjaković F., Nauka o toplini III, Tehnička knjiga, Zagreb</td><td></td><td></td></tr>
<tr><td>Supplemental literature</td><td colspan="6">Bejan A., Advanced Engineering Thermodynamics, 3rd edition, John Wiley & Sons, Inc., 2006</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of established learning outcomes</td><td colspan="6">• Evaluation of results in accordance with the specified learning outcomes
• Feedback from students through a student survey
• Teacher self-evaluation
• Institutional and extra-institutional checks</td></tr>
<tr><td>Other (according to the proposer's</td><td colspan="6"></td></tr>
</table>

<table>
<tr><td>SUBJECT NAME</td><td colspan="5">Technical supervision of sea-going vessels</td></tr>
<tr><td>Code</td><td>DS08</td><td>Year of study</td><td colspan="3">1</td></tr>
<tr><td>Subject holder/s</td><td>Assoc. Prof. Ivan Komar</td><td>Point value (ECTS)</td><td colspan="3">5</td></tr>
<tr><td rowspan="2">Collaborators</td><td rowspan="2"></td><td rowspan="2">Teaching method (hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>20</td><td>10</td><td>0</td><td>0</td></tr>
<tr><td>Subject status</td><td>Elective</td><td>Percentage of e-learning</td><td colspan="3"></td></tr>
<tr><td colspan="6">SUBJECT DESCRIPTION</td></tr>
<tr><td>Subject objectives</td><td colspan="5">This Subject aims to acquire knowledge important for scientific and professional development and to familiarize students with the basics of classification and statutory supervision, as a basis for developing the necessary specific knowledge for successful preparation for everyday cooperation and interaction with experts from various inspection bodies that conduct supervision of ships and other maritime facilities. By mastering the curriculum, students will learn what are the starting points for the observations they receive on a maritime facility, what they must accept, what they may discuss, and within which requirements they must/may remove the observations. The aim is also to present a system for implementing an analysis of maritime facility management from the aspect of applying international standards for classification and statutory certification, starting from the technological and safety parameters of the current or predicted future state of shipping, and in this way maintain full potential, operational efficiency and safety of life, property and the environment at sea.</td></tr>
<tr><td>Subject enrolment requirements and entry competencies required for the</td><td colspan="5">Completed graduate university studies in a technical field.</td></tr>
<tr><td>Expected learning outcomes at the subject level (4-10 learning outcomes)</td><td colspan="5">After successfully completing the subject, doctoral students will be able to:
1. Explain and correctly interpret the Rules of the IACS member classification societies for the classification and statutory certification of maritime vessels.
2. Independently search and analyse scientific literature in the field of class maintenance and statutory certification of maritime vessels.
3. Analyse the management system of maritime facilities from the aspect of the application of international standards for classification and statutory certification.
4. Plan and prepare the ship for inspection by the classification society and statutory institutions.
5. Analyse and critically assess specific cases of failures in ship equipment.</td></tr>
<tr><td>The subject content is elaborated in detail according to the class schedule</td><td colspan="5">Introduction and basic concepts
Historical development
Basic division of maritime structures
International starting points for the classification of maritime structures
International starting points for the statutory certification of maritime structures
Basic processes in the system of technical supervision of maritime structures
Supervision of the Croatian Register of Shipping
Technical rules of classification societies and recognized organizations
Approval of technical documentation
Supervision of the construction of maritime structures
Supervision of the modification of maritime structures
Basic inspection of newly acquired maritime structures</td></tr>
</table>

	Type approval of machinery, devices and marine equipment Approval of manufacturers, testing institutions and service companies Supervision by other inspection bodies The role of quality management in technical supervision Concluding remarks
Types of teaching	☒ lectures ☒seminars and workshops □ exercises □ on line in full □ mixed e-learning □ fieldwork □ independent tasks □ multimedia □ laboratory □ mentoring work □ (other, write in)
Student obligations	

Monitoring student work (enter the share in ECTS points for each activity so that the total number of ECTS points corresponds to the subject credit value)						
	Attending classes	0,75	Research		Practical work	
	Experimental work		Report		(other, write in)	
	Essay		Seminar paper	1,25	(other, write in)	
	Colloquia		Oral exam		(other, write in)	
	Written exam		Project	1	(other, write in)	

Grading and evaluating student work during classes and at the final exam	The doctoral student is required to attend lectures, seminars and exercises, participate independently and defend the seminar paper. The doctoral student is assessed orally.

Required literature (available in the library and	**Title**	**Number of copies in the library**	**Availability through other media**
	Rules for the Classification of Sea-Going Ships, Part 1. - General Requirements, Croatian Register of Shipping, Split, 2013		

Supplemental literature	1. IMO Res. 739(18) – Guidelines for the authorization of organization on behalf of the Administration 2. IMO Res. 789(19)- Specification on the survey and certification functions of RO acting on behalf of the Administration 3. IACS Unified Requirements, www.iacs.org.uk 4. IMO publikacije SOLAS i MARPOL 5. *The shipmaster's business companion*, The Nautical Institute Fourth edition, London 2004, www.nautinst.org 6. Vaughan,B.:*The Liability of Classification Societies*, University of Cape Town, 2006
Quality assurance methods that ensure the acquisition of established learning outcomes	• Evaluation of results in accordance with the specified learning outcomes • Feedback from students through a student survey • Teacher self-evaluation • Institutional and extra-institutional checks
Other (according to the proposer's opinion)	

<table>
<tr><td>SUBJECT NAME</td><td colspan="5">Mathematical methods in maritime studies</td></tr>
<tr><td>Code</td><td>DS09</td><td>Year of study</td><td colspan="4">1</td></tr>
<tr><td>Subject holder/s</td><td>Assoc. Prof. Tatjana Stanivuk</td><td>Point value (ECTS)</td><td colspan="4">5</td></tr>
<tr><td rowspan="2">Collaborators</td><td rowspan="2"></td><td rowspan="2">Teaching method (hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>12</td><td>10</td><td>8</td><td>0</td></tr>
<tr><td>Subject status</td><td>Elective</td><td>Percentage of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="6">SUBJECT DESCRIPTION</td></tr>
<tr><td>Subject objectives</td><td colspan="5">To introduce doctoral students to the most important mathematical methods applicable in maritime affairs and provide them with the basic knowledge so that they can independently apply them in the research part of their doctoral dissertation.</td></tr>
<tr><td>Subject enrolment requirements and entry competencies required for the</td><td colspan="5">Completed graduate university studies.</td></tr>
<tr><td>Expected learning outcomes at the subject level (4-10 learning outcomes)</td><td colspan="5">After successfully completing the subject, doctoral students will be able to:
1. Respond to the research problem set, i.e. design your own research.
2. Independently select, use and apply a specific mathematical method in the research part of the paper.
3. Synthesize the mastered mathematical methods applicable in the field of maritime affairs.
4. Determine the appropriate mathematical method and report on your research in the form of a scientific paper.
5. Publish the results of the research.
6. Implement mathematical knowledge and mathematical methods in maritime transport in a way that opens the way to some new knowledge and techniques.
7. Critically consider the possibility of using a new mathematical method and its applicability in maritime affairs.</td></tr>
<tr><td>The subject content is elaborated in detail according to the class schedule</td><td colspan="5">Lectures
1. Graph theory and applications in maritime (2 hours)
2. Theory of linear programming (2 hours)
3. Transport and distribution problems (2 hours)
4. Different modifications of the transport problem (2 hours)
5. Transport network (2 hours)
6. Theory of strategic games (2 hours)
Exercises
1. Geometric solving of linear programming problems (2 hours)
2. Numerical solution of a linear problem (2 hours)
3. Linear transport models (2 hours)
4. Fractured linear programming (2 hours)
Seminars
1. Elements of input-output analysis on maritime models (2 hours)
2. Optimal production programme in maritime (2 hours)
3. Linear transport models (2 hours)
4. Fractional linear programming on maritime cases (2 hours)
5. Game model on maritime cases (2 hours)</td></tr>
</table>

<table>
<tr><td>Types of teaching</td><td colspan="3">☒ lectures
☒seminars and workshops
☒exercises
□ on line in full
□ mixed e-learning
□ fieldwork</td><td colspan="3">☒ independent tasks
☒ multimedia
□ laboratory
☒ mentoring work
☒ (other, write in)</td></tr>
<tr><td>Student obligations</td><td colspan="6">Attendance at classes, regular consultations, preparation of a seminar paper based on recent literature in the field of doctoral work with special emphasis on the mathematical methods used.</td></tr>
<tr><td rowspan="5">Monitoring student work (enter the share in ECTS points for each activity so that the total number of ECTS points corresponds to the subject credit value)</td><td>Attending classes</td><td>0,875</td><td>Research</td><td>1</td><td>Practical work</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(other, write in)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar paper</td><td>2</td><td>(other, write in)</td><td></td></tr>
<tr><td>Colloquia</td><td></td><td>Oral exam</td><td>0,125</td><td>(other, write in)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td>1</td><td>(other, write in)</td><td></td></tr>
<tr><td>Grading and evaluating student work during classes and at the final exam</td><td colspan="6">The assessment of doctoral candidates is oral. The doctoral candidate's work during classes, seminar paper, and the quality and originality of the independent research draft are evaluated.</td></tr>
<tr><td rowspan="7">Required literature (available in the library and through other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability through other media</td></tr>
<tr><td colspan="3">Berge, C., Ghouilla-Houri, A.: Games and transportation networks. London, 1965.</td><td></td><td></td></tr>
<tr><td colspan="3">Hillier, F. S., Lieberman, G. J.: Introduction to Operations Research. San Francisco, 1969.</td><td></td><td></td></tr>
<tr><td colspan="3">Martić, Lj.: Primjena matematičkih metoda u ekonomskoj analizi. Informator - Zagreb, 1971.</td><td></td><td></td></tr>
<tr><td colspan="3">Pašagić H.: Matematičke metode u prometu. FPZ, Zagreb, 2003.</td><td></td><td></td></tr>
<tr><td colspan="3">Robinson, J.: An Iterative Method of Solving a Game. Annals of Mathematics, 1951.</td><td></td><td></td></tr>
<tr><td colspan="3">Vajda, S.: An introduction to Liear Programming and the Theory of Games. London, 1960.</td><td></td><td></td></tr>
<tr><td>Supplemental literature</td><td colspan="6">1. Bazar, M., Jarvis, J., Sherali, H.: Liner programming and network. New York, 1990.
2. Gordon, G., Pressman, I.: Quantitative decision making for business. London, 1983.
3. Meško, I.: Graf i mreže. Maribor, 1975.
4. Pašagić, H.: Matematičko modeliranje i teorije grafova. Fakultet prometnih znanosti, Zagreb, 1998.
5. Vujošević, M., Stanojević, M., Mladenović, N.: Metode optimizacije – mrežni, lokacijski i višekriterijalni modeli. DOPIS, Beograd, 1996.
6. Vukadinović, S., Cvejić, S.: Matematičko programmeiranje. Priština, 1996.</td></tr>
</table>

Quality assurance methods that ensure the acquisition of established learning outcomes	• Evaluation of results in accordance with the specified learning outcomes • Feedback from students through a student survey • Teacher self-evaluation • Institutional and non-institutional checks
Other (according to the proposer's opinion)	

SUBJECT NAME	**Modelling and optimization of maritime transport systems**					
Code	DS10	Year of study	1			
Subject holder/s	Full Prof. Danko Kezić Assoc. Prof. Anita Gudelj	Point value (ECTS)	5			
Collaborators		Teaching method (hours per semester)	L	S	E	F
			25	0	5	0
Subject status	Elective	Percentage of e-learning				
SUBJECT DESCRIPTION						
Subject objectives	The subject provides adequate basic knowledge in the field of modelling and optimization of maritime systems. PhD students will be trained to analyse, model, and optimize maritime transport systems and develop control algorithms that increase the utilization and efficiency of system resources, using the theory of discrete event systems and genetic algorithms.					
Subject enrolment requirements and entry competencies required for the	Completed graduate university studies in the field of technical sciences.					
Expected learning outcomes at the subject level (4-10 learning outcomes)	After successfully completing the subject, doctoral students will be able to: 1. Present the type of discrete systems used for modelling maritime traffic. 2. Sketch a model of a maritime traffic system using finite automata and Petri nets. 3. Apply an algorithm for examining conflict and deadlock states in the resulting model. 4. Synthesize a traffic system control model without deadlock states. 5. Critically evaluate published original scientific results of other authors in the field of Petri net integration and genetic algorithms. 6. Mathematically model the problem of job scheduling optimization in a relevant maritime system and argue for it. 7. Develop a software solution for integrating Petri nets and genetic algorithms for job scheduling optimization and critically evaluate it. 8. As an author or co-author, write and publish an original scientific paper in an internationally peer-reviewed journal.					

The subject content is elaborated in detail according to the class schedule	**Lectures** 1. System division (3 hours) 2. Discrete event traffic systems, examples in maritime (3 hours) 3. Automaton theory, Petri nets (3 hours) 4. Conflict, deadlock and infinite waiting prevention (3 hours) 5. Stability analysis of traffic systems in terms of resource constraints (3 hours) 6. Optimization of maritime system job scheduling (3 hours) 7. Genetic algorithm method (2 hours) 8. Implementation of genetic algorithm for job scheduling (2 hours) 9. Petri net and genetic algorithm integration model for job scheduling (4 hours) 10. Application of the model to maritime systems (4 hours) **Exercises** 1. Model the maritime system (2 hours) 2. Analyse the state of conflicts and congestion (1 hour) 3. Develop an algorithm for optimal traffic management (2 hours) **Seminar** 1. Modelling and Optimization of a Maritime Transport System – Case Study

Types of teaching	☒ lectures ☒seminars and workshops ☒ exercises □ on line in full □ mixed e-learning □ fieldwork	□ independent tasks □ multimedia □ laboratory □ mentoring work □ (other, write in)

Student obligations						
Monitoring student work (enter the share in ECTS points for each activity so that the total number of ECTS points corresponds to the subject credit	Attending classes	0,875	Research		Practical work	
	Experimental work		Report		(other, write in)	
	Essay		Seminar paper	3	(other, write in)	
	Colloquia		Oral exam	1,125	(other, write in)	
	Written exam		Project		(other, write in)	

Grading and evaluating student work during classes and at the final exam	The doctoral student is required to attend lectures, seminars and exercises, participate independently and defend the seminar paper. The doctoral student is assessed orally.

Required literature (available in the library and through other media)	**Title**	**Number of copies in the library**	**Availability through other media**
	Reisig, W.: *Understanding Petri Nets: Modeling Techniques, Analysis Methods,* Case Studies Springer, 2013.	1	
	Golub, M. *Genetski algoritmi*, Fakultet elektrotehnike i računarstva, Zavod za elektroniku, mikroelektroniku, računalne i inteligentne sustave, 2002.		http://www.zemris.fer.hr/~golub/ga/ga.html
	Kezić, D.: *Sprječavanje potpunog zastoja u sustavima s diskretnim događajima primjenom Petrijevih mreža*, Doktorska disertacija, Sveučilište u Zagrebu, Fakultet elektrotehnike i računarstva, Zagreb, 2004.	1	
	Gudelj, A: *Optimalizacija sustava s diskretnim događajima primjenom Petrijevih mreža i genetskih algoritama,* Doktorska disertacija, Sveučilište u Zagrebu, Fakultet organizacije i informatike, Varaždin, 2010.	1	
	David, R., Alla H., *Discrete, Continuous, and Hybrid Petri Nets,* Springer, Berlin Heidelberg New York, 2010.	1	

Supplemental literature	
Quality assurance methods that ensure the acquisition of established learning outcomes	• Evaluation of results in accordance with the specified learning outcomes • Feedback from students through a student survey • Teacher self-evaluation • Institutional and extra-institutional checks
Other (according to the proposer's opinion)	

SUBJECT NAME	**Energy efficiency in maritime transport**					
Code	DS11	Year of study	1			
Subject holder/s	Asst. Prof. Maja Krčum	Point value (ECTS)	5			
Collaborators		Teaching method (hours per semester)	L	S	E	F
			20	5	5	0
Subject status	Elective	Percentage of e-learning	20%			
SUBJECT DESCRIPTION						
Subject objectives	The adoption of resolution MEPC.203 (62) and the amendment of Annex VI to MARPOL improve the energy efficiency of ships by using design and operational measures that result in the reduction of emissions of particulate matter resulting from the combustion of fossil fuels, including greenhouse gas emissions. The aim of this subject is to highlight energy efficiency measures in the maritime transport sector in order to reduce energy consumption. The emphasis is placed on renewable energy sources and their application in the maritime sector, while at the same time raising the awareness of stakeholders to take measures that contribute to a “clean” energy infrastructure for ships in ports, harbours and at sea.					
Subject enrolment requirements and entry competencies required for the	Completed graduate university studies in a technical field.					
Expected learning outcomes at the subject level (4-10 learning outcomes)	After successfully completing the subject, doctoral students will be able to: 1. To create and interpret new knowledge in the field of application of renewable sources as well as technologies that contribute to energy efficiency, especially in the field of marine technology. 2. Publish the research results. 3. Apply knowledge and research to create a concept and implement a project that generates new knowledge and technologies in the field of energy efficiency in maritime transport. 4. Create a judgment based on critical analysis, evaluation and synthesize new and complex ideas in the field of energy efficiency, thereby contributing to the strengthening of social, scientific and ethical responsibility. 5. Contribute to the development of quality and generic skills that are necessary for employment/self-employment. 6. In academic and professional contexts, promote technological progress in the field of new technologies that contribute to energy efficiency in maritime transport.					

<table>
<tr><td>The subject content is elaborated in detail according to the class schedule</td><td colspan="6">Lectures
1. Application of the Energy Efficiency Design Index (EEDI) and the Ship Energy Efficiency Management Plan (SEEMP) (2 hours)
Measures and environmental standards that determine the energy efficiency index for ships (higher quality materials, nanotechnology improvements to materials, application of complex sensors and control systems in all engine operation segments, optimization of thermal combustion, more efficient navigation system control, optimization of cargo distribution, reduction of harmful gas emissions) (8 hours)
3. Towards a hybrid approach to the use of additional renewable energy sources (2 hours)
4. Impact of development policy, regulations and the effect of incentives aimed at encouraging energy efficiency in shipping, ports and terminals (4 hours)
5. Use of renewable energy sources in ports and terminals and comparison with the use of renewable sources on land (2 hours)
6. Corporate responsibility towards the environment, especially in ports and with an emphasis on energy efficiency (shore connection, high-voltage connections, etc.) (4 hours)
7. Use of wind energy at sea (2 hours)
8. Energy management in shipping, ports and terminals (2 hours)
9. Creating a simulation model - optimizing energy sources on board (solar panels, wind, turbine) (2 hours)
10. Creating a simulation model - optimizing energy sources on land (terminal, port) (2 hours)

Seminars
1. Creation of a simulation model - optimization of energy sources on board (solar panels, wind, turbine) (4 hours)
2. Creation of a simulation model - optimization of energy sources on land (terminal, port) (4 hours)

Exercises
1. Creation of a simulation model - optimization of energy sources on board (solar panels, wind, turbine) (4 hours)
2. Creation of a simulation model - optimization of energy sources on land (terminal, port) (3 hours)</td></tr>
<tr><td>Types of teaching</td><td colspan="3">☒ lectures
☒seminars and workshops
☒exercises
□ on line in full
□ mixed e-learning
□ fieldwork</td><td colspan="3">□ independent tasks
□ multimedia
□ laboratory
□ mentoring work
□ (other, write in)</td></tr>
<tr><td>Student obligations</td><td colspan="6"></td></tr>
<tr><td rowspan="5">Monitoring student work (enter the share in ECTS points for each activity so that the total number of ECTS points corresponds to the subject credit value)</td><td>Attending classes</td><td>1</td><td>Research</td><td>1</td><td>Practical work</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(other, write in)</td><td></td></tr>
<tr><td>Essay</td><td>1</td><td>Seminar paper</td><td>1</td><td>(other, write in)</td><td></td></tr>
<tr><td>Colloquia</td><td></td><td>Oral exam</td><td>1</td><td>(other, write in)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(other, write in)</td><td></td></tr>
<tr><td>Grading and evaluating student work during classes and at the final exam</td><td colspan="6">The doctoral candidate is required to attend lectures, seminars and exercises and to participate independently, defend a seminar paper, and independently write and present a scientific research paper. The doctoral candidate is assessed orally.</td></tr>
</table>

	Title	Number of copies in the	Availability through other media
Required literature (available in the library and through other media)	Krčum, M.; Gudelj, A.; Krčum, P.: *The Renewable Energy on Ship: Simulation and Optimization*, International Conference on Traffic and Transport Engineering - Belgrade, November 29-30, 2012. , p.p.11-20/ Ph. D Olja Čokorilo, editor (lecture international, peer-review, published, scientific)		
	Florentinus A., Hamelinck C., Van den Bos A., Winkel R., & Cuijpers M. (2011). *Potential of biofuels for shipping.* Ecofys 2011 by order of: European Maritime Safety Agency (EMSA)		
	Marine Environment Protection Committee (MEPC), 56th session: 9-13 July 2007. 6. International Bunkering Industry Association		
	P.E. Hřjlund Nielsen. (2011). *OBATE: An upgraded alcohol fuel for efficient & clean Diesel engine application*. Marine Days. Goteborg, Sweden		
Supplemental literature	1. Odense Steel Shipyard Ltd Ørndrup Nielsen B., (2009). *Green Ship of the Future* Concept study 2. Nielsen C.K, & Schack C. (2012) *Vessel emission study: Comparison of various abatement technologies to meet emission levels for ECA's*. 9th annual Green Ship Technology 3. www.cepal.org/transporte		
Quality assurance methods that ensure the acquisition of established learning outcomes	• Evaluation of results in accordance with the specified learning outcomes • Feedback from students through a student survey • Teacher self-evaluation • Institutional and extra-institutional checks		
Other (according to the proposer's opinion)			

SUBJECT NAME	**Advanced algorithms in traffic monitoring systems**					
Code	DS12	Year of study	1			
Subject holder/s	Assoc. Prof. Igor Vujović Assoc. Prof. Joško Šoda	Point value (ECTS)	5			
Collaborators	Asst. Prof. Petar Matić	Teaching method (hours per semester)	L	S	E	F
			20	10	0	0
Subject status	Elective	Percentage of e-learning	10			
SUBJECT DESCRIPTION						
Subject objectives	The subject aims to create and evaluate theoretical knowledge in advanced algorithms that are needed at different levels of thinking, implementation, design and development of surveillance systems used in traffic technology. The subject enables the doctoral student to take on ethical and social responsibility related to surveillance systems and offers tools for research and development of applications or parts of applications that surveillance systems consist of. The subject covers wavelet and multiresolution signal processing and analysis techniques, statistical quality measures, application of algorithms in software tools for image processing and analysis, image processing and analysis systems in the visible and infrared regions, algorithms for low, medium and high-level image analysis.					

	Also investigated are differences in traffic control depending on the type (land, rail, maritime, river, air) and the impact of different weather conditions on the performance of computer vision algorithms, image fusion, etc. Applications in the prevention and control of environmental incidents, prevention of criminal and terrorist activities, improvement of work methods and organization, control of goods movement, intelligent alarm systems. Control of drones for search and rescue. Clustering and identification of vessels from surveillance sensors in the water area.
Subject enrolment requirements and entry competencies required for the subject	Completed graduate study at PEIT, FESB or a related study programme.
Expected learning outcomes at the subject level (4-10 learning outcomes)	After successfully completing the subject, doctoral students will be able to: 1. Create, research and evaluate signal processing and analysis algorithms for traffic surveillance applications. 2. Critically evaluate quality measures and the selection of measures for assessing the performance of algorithms and modules for signal processing and analysis within surveillance applications. 3. Analyse and critically assess statistical criteria for assessing the safety and control of the movement of people and goods in traffic systems, ports, warehouses and on roads (land, air and water). 4. Predict, using mathematical tools, a time-frequency analysis algorithm for use in surveillance applications.
The subject content is elaborated in detail according to the class schedule	**Lectures** 1. Overview of traffic control systems and their components. (1 hour) 2. Overview of satellite and remote sensors in traffic. Locally placed sensors. Applications in coastal surveillance and sea rescue. (1 hour) 3. Signal processing as a basic algorithm for analysing surveillance systems. Modern algorithms in signal processing and analysis. (1 hour) 4. Time-frequency signal analysis. Algorithms in wavelet transformation: continuous, discrete and complex. Definitions of quality measures for evaluating the effectiveness of algorithms. (2 hours) 5. Wavelet transformation at the so-called low level of processing and the so-called high level of processing. Algorithm with an adapted wavelet and its application. (4 hours) 6. Algorithms in signal processing and analysis in 2D and 3D space. (1 hour) 7. Integral transformations derived from wavelets: EMD, curvelets, contourlets, edgelets, ridgelets, bandelets, shapelets and the application of the forementioned advanced algorithms in the so-called low level of processing. (2 hours) 8. Stochastic signals and the impact of interference and various types of noise on traffic surveillance systems through standard defined quality measures. Compensation of the above impacts. Impact of weather conditions on sensors in surveillance applications. (2 hours) 9. The role of automated scouts in surveillance and search and rescue in the water area (vessels, aircraft). (2 hours) 10. Clustering and identification of vessels from surveillance sensors in the water area. (1 hour) 11. Identification and counting of vessels outside the AIS system. (1 hour) 12. Connection of VTS technology and sensor fusion with maritime traffic surveillance tasks. (2 hours) **Seminar:** Research and development of algorithms for traffic control systems.

<table>
<tr><td>Types of teaching</td><td colspan="3">☒ lectures
☒seminars and workshops
□ exercises
□ on line in full
□ mixed e-learning
□ fieldwork</td><td colspan="3">☒independent tasks
□ multimedia
□ laboratory
☒mentoring work
□ (other, write in)</td></tr>
<tr><td>Student obligations</td><td colspan="6"></td></tr>
<tr><td rowspan="5">Monitoring student work (enter the share in ECTS points for each activity so that the total number of ECTS points corresponds to the subject credit value)</td><td>Attending classes</td><td>1</td><td>Research</td><td>2</td><td>Practical work</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(other, write in)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar paper</td><td>1</td><td>(other, write in)</td><td></td></tr>
<tr><td>Colloquia</td><td></td><td>Oral exam</td><td>1</td><td>(other, write in)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(other, write in)</td><td></td></tr>
<tr><td>Grading and evaluating student work during classes and at the final exam</td><td colspan="6">The doctoral student works independently, with the guidance of the teacher, on research in the field of the subject. He/she must publish a scientific paper in a relevant scientific journal. At the end, he/she takes an oral exam.
The grade is determined as the mean value:
• evaluation of the quality of the written review paper
• evaluation of its oral presentation and
• evaluation of the results of the simulation of the given problem.</td></tr>
<tr><td rowspan="5">Required literature (available in the library and through other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability through other media</td></tr>
<tr><td colspan="3"></td><td></td><td></td></tr>
<tr><td colspan="3"></td><td></td><td></td></tr>
<tr><td colspan="3"></td><td></td><td></td></tr>
<tr><td colspan="3"></td><td></td><td></td></tr>
<tr><td>Supplemental literature</td><td colspan="6">Articles in relevant scientific databases
1. Vidakovic, Brani: „Statistical Modeling by Wavelets“, John Wiley & Sons, inc., 1999.
2. Donoho, David L., Johnstone, Iain M.: „Adapting to Uknown Smoothness via Wavelet Shrinkage“, Department of Statistics, Stanford University, 1994.
3. Strang, G.; Nquyen, T.: Wavelets and Filter Banks, Wellesley – Cambridge Press, MA (USA), 1997.
4. Mallat, S.: A Wavelet Tour of Signal Processing, 3rd Edition, ACADEMIC PRESS, 2008.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of established learning outcomes</td><td colspan="6">• Evaluation of results in accordance with the specified learning outcomes
• Feedback from students through a student survey
• Teacher self-evaluation
• Institutional and extra-institutional checks</td></tr>
<tr><td>Other (according to the proposer's opinion)</td><td colspan="6"></td></tr>
</table>

<table>
<tr><td>SUBJECT NAME</td><td colspan="5">Sustainable maritime transport system from the aspect of ecology and environmental protection</td></tr>
<tr><td>Code</td><td>DS13</td><td>Year of study</td><td colspan="3">1</td></tr>
<tr><td>Subject holder/s</td><td>Assoc. Prof. Gorana Jelić Mrčelić;
Assoc. Prof. Merica Slišković</td><td>Point value (ECTS)</td><td colspan="3">5</td></tr>
<tr><td rowspan="2">Collaborators</td><td rowspan="2"></td><td rowspan="2">Teaching method (hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>20</td><td>10</td><td>0</td><td>0</td></tr>
<tr><td>Subject status</td><td>Elective</td><td>Percentage of e-learning</td><td colspan="3"></td></tr>
<tr><td colspan="6">SUBJECT DESCRIPTION</td></tr>
<tr><td>Subject objectives</td><td colspan="5">After successfully completing the subject, doctoral students will be able to:
1. Independently search and analyse scientific literature in the field of maritime transport sustainability.
2. Critically assess the sustainability features of the maritime transport system – ecological principles.
3. Propose optimal solutions that meet sustainability.
4. Write and present a review paper in the specified field.</td></tr>
<tr><td>Subject enrolment requirements and entry competencies required for the subject</td><td colspan="5">Completed graduate university studies.</td></tr>
<tr><td>Expected learning outcomes at the subject level (4-10 learning outcomes)</td><td colspan="5">1. Analyse and compare the concepts of ecology, environmental protection and sustainability.
2. Scientifically analyse marine systems (structure of the marine ecosystem, their function...).
3. Connect key elements of the marine ecosystem into a functional whole.
4. Analyse key threats to the sustainability of the marine environment from maritime transport.
5. Critically assess the impact of maritime transport on the marine environment.
6. Analyse the criteria for selecting policies aimed at protecting the marine environment and compare and synthesize current practices.
7. Analyse and synthesize EU policies - legal bases, strategies, policies...</td></tr>
<tr><td>The subject content is elaborated in detail according to the class schedule</td><td colspan="5">Lectures
1. Structure and function of the marine ecosystem (2 hours)
2. Stability of the marine ecosystem (1 hour)
3. Marine ecosystem as a functional unit (1 hour)
4. Ship as a source of pollution of the marine environment (3 hours)
5. Changes in the marine ecosystem caused by maritime traffic (3 hours)
6. Sustainable development and integrated coastal zone management – basic concepts (1 hour)
7. Legal framework for the protection of the (marine) environment (2 hours)
8. Strategies and policies for environmental protection and (maritime) transport, environmental impact assessment and strategic environmental impact assessment (2 hours)
9. Examples of practice/case studies (5 hours)
Seminar
Sustainable maritime transport system from the perspective of ecology and environmental protection (10 hours)</td></tr>
</table>

Types of teaching	☒ lectures ☒seminars and workshops □ exercises □ on line in full □ mixed e-learning □ fieldwork	□ independent tasks □ multimedia □ laboratory □ mentoring work □ (other, write in)
Student obligations		

Monitoring student work (enter the share in ECTS points for each activity so that the total number of ECTS points corresponds to the subject credit value)						
	Attending classes	1	Research	1	Practical work	
	Experimental work		Report		(other, write in)	
	Essay	1	Seminar paper	1	(other, write in)	
	Colloquia		Oral exam	1	(other, write in)	
	Written exam		Project		(other, write in)	

Grading and evaluating student work during classes and at the final exam	The doctoral candidate is required to attend lectures, seminars and exercises, participate independently and defend the seminar paper. The doctoral candidate is assessed orally.

Required literature (available in the library and through other media)	**Title**	**Number of copies in the library**	**Availability through other media**
	1. Field JG, Hempel G, Summerhayes (2002): *Oceans 2020*, Island Press, London		Yes (e-book)
	2. EASAC (2016): *Marine sustainability in an age of changing oceans and seas*		Yes (e-book)
	1. IMO (2016): *A concept of a sustainable maritime transportation system*		Yes (e-book)

Supplemental literature	Nanda VP, Pring G (2013): *International Environmental Law and Policy for the 21st Century*, Martinus Nijhof Publishers
Quality assurance methods that ensure the acquisition of established learning outcomes	• Evaluation of results in accordance with the specified learning outcomes • Feedback from students through a student survey • Teacher self-evaluation • Institutional and extra-institutional checks
Other (according to the proposer's opinion)	

SUBJECT NAME	Forensic hydrography, modelling and simulation						
Code	DS 14	Year of study	1				
Subject holder/s	Full Prof. Josip Kasum	Point value (ECTS)					
Collaborators		Teaching method (hours per semester)	L	S	E	F	
			20	0	10	0	
Subject status	Elective	Percentage of e-learning					

SUBJECT DESCRIPTION

Subject objectives	• deepening knowledge of modelling using examples of forensic hydrography models • creation of new models in forensic hydrography • preparation for research and development in forensic hydrography and maritime applications
Subject enrolment requirements and entry competencies required for the	Completed graduate university studies.
Expected learning outcomes at the subject level (4-10 learning outcomes)	After successfully completing the subject, doctoral students will be able to: 1. Independently search and analyse scientific literature in the field of hydrography. 2. Apply mathematical, physical and scientific principles in research and development of new knowledge in forensic hydrography. 3. Write and present a review paper on technological solutions investigated on the developed model. 4. Critically assess the features of new technologies for collecting relevant system parameters used in hydrographic activities. 5. Propose new solutions. 6. Evaluate new methods, tools and instruments in the field of modelling and simulation in forensic hydrography with application in maritime.
The subject content is elaborated in detail according to the class schedule	• Goals and tasks of process modelling in forensic hydrography • Goals and tasks of process simulation in forensic hydrography • Forensic hydrography models • Hydrography system modelling • User system modelling • Prevention system modelling • Analysis system modelling in forensic hydrography • Synthesis system modelling in forensic hydrography • Validation testing of developed models • Application of simulation models in forensic hydrography and maritime
Types of teaching	☒ lectures ☒seminars and workshops ☒ exercises □ on line in full □ mixed e-learning □ fieldwork ☒ independent tasks □ multimedia ☒ laboratory ☒ mentoring work □ (other, write in)
Student obligations	Active participation in all forms of teaching; lectures, consultations, literature searches, independent work on modelling the assigned problem.

Monitoring student work (enter the share in ECTS points for each activity so that the						
	Attending classes	1,5	Research	1,5	Practical work	1,5
	Experimental work		Report		(other, write in)	
	Essay		Seminar paper	1,5	(other, write in)	

total number of ECTS points corresponds to the Subject credit value)	Colloquia		Oral exam		(other, write in)	
	Written exam		Project		(other, write in)	
Grading and evaluating student work during classes and at the final exam	The grade is determined as the mean value: • evaluation of the quality of the written review paper • evaluation of its oral presentation and • evaluation of the results of the simulation of the given problem.					

	Title	**Number of copies in the**	**Availability through other media**
Required literature (available in the library and through other media)	*Manual on hydrography*, IHO, Monaco, 2011		
	Pavić, I., Kasum, J., Perkušić, M., Organizational and Legal Aspects of International Hydrographic Activity, *Naše more*: 61 (5-6), 117-123, 2014		
	Kasum, J., Cvjetković, S., J., Stanivuk, T., Dynamic Model for Calculating the VHF Radio Horizon at Sea, *Brodogradnja: Teorija i praksa brodogradnje i pomorske tehnike* 64 (4), 482-487, 2013		
	Kasum, J., Pavić, I., Mišković, J., Increase of Combat Effectiveness of Warships with the Introduction into Operation of WECDIS, *Naše more*, 60 (3-4), 55-60, 2013		
	Russo, A., I, Urlić, J., Kasum, J., Human resources and their possible forensic meanings. *Psychiatria Danubina* 27 (1), 123-129, 2015		

Supplemental literature	1. Jeličić, T., Modrić, D., Kasum, J., *Standardization of colours on charts*, Međunarodni znanstveni skup Tiskarstvo & dizajn, 2017 2. Jeličić, T., Gržetić, Z., Kasum, J., *Development of publishing activities of hydrographic organizations*, 17. međunarodna konferencija tiskarstva, dizajna i grafičkih komunikacija, 2013 3. Jeličić, T., Kasum, J., Pogancic, M., *Development of graphic technology and advancement of publishing-and-printing activities of hydrographic organizations*, 16. medjunarodna konferencija tiskarstva, dizajna i grafičkih komunikacija, 2012 4. Jeličić, T., Gržetić, Z., Kasum, J., *Contribution of graphic technology in the production of nautical charts and publications*, Space, Heritage & Future-GIS Odyssey 2010
Quality assurance methods that ensure the acquisition of established learning outcomes	• Evaluation of results in accordance with the specified learning outcomes • Feedback from students through a student survey • Teacher self-evaluation • Institutional and extra-institutional checks
Other (according to the proposer's opinion)	

<table>
<tr><td>SUBJECT NAME</td><td colspan="5">Synthesis of control systems in high-risk sea areas</td></tr>
<tr><td>Code</td><td>DS15</td><td>Year of study</td><td colspan="4"></td></tr>
<tr><td>Subject holder/s</td><td>Asst. Prof. Rino Bošnjak
Full Prof. Danko Kezić</td><td>Point value (ECTS)</td><td colspan="4">5</td></tr>
<tr><td rowspan="2">Collaborators</td><td rowspan="2"></td><td rowspan="2">Teaching method (hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>25</td><td>0</td><td>5</td><td>0</td></tr>
<tr><td>Subject status</td><td>Elective</td><td>Percentage of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="6">SUBJECT DESCRIPTION</td></tr>
<tr><td>Subject objectives</td><td colspan="5">The subject provides adequate basic knowledge in the field of innovative technologies in maritime affairs. Modern technologies in maritime areas with increased collision risk are considered. PhD students will be trained to analyse, model and simulate maritime traffic systems where the risk of collision is increased, using nautical simulators in combination with the theory of discrete event systems.</td></tr>
<tr><td>Subject enrolment requirements and entry competencies required for the</td><td colspan="5">Completed graduate university studies in the field of technical sciences.</td></tr>
<tr><td>Expected learning outcomes at the subject level (4-10 learning outcomes)</td><td colspan="5">After successfully completing the subject, doctoral students will be able to:
1. Present the applications of new technologies in maritime transport.
2. Apply and demonstrate a formal method within a surveillance system.
3. Define types of crossing models according to priorities (P) and ship importance (W).
4. Define terms and types of networks used to synthesize a surveillance system in areas of increased collision risk.
5. Present the functioning of a crossing supervisor.
6. Develop an algorithm for a sector supervisor in an area of increased collision risk.
7. Develop an appropriate type of Petri net based on a case study.
8. Write and publish an original scientific paper in an internationally peer-reviewed journal as an author or co-author.</td></tr>
<tr><td>The subject content is elaborated in detail according to the class schedule</td><td colspan="5">Lectures
1. Application of new technologies in maritime (3 hours)
2. Discrete event traffic systems - examples in maritime (3 hours)
3. Theory of supervisory control in maritime (ports and canals) (3 hours)
4. Development of a formal method with application in supervisory systems (3 hours)
5. Application of mathematical methods in specific sea passages with the aim of preventing collisions and collision situations (3 hours)
6. Crossing models and synthesis of the supervisory system (2 hours)
7. Basic concepts and types of Petri nets used for the synthesis of the supervisory system (2 hours)
8. Synthesis of crossing supervisors in maritime traffic (2 hours)
9. Synthesis of Petri nets on a case study in maritime traffic (2 hours)
10. Types of networks used in crossing supervisors in specific sea passages and approaches to ports (2 hours)
Exercises
1. Visual object net, Matlab ver. 2016. (2 hours)
2. NTPRO 5000 Transas simulator (2 hours)
3. Collision simulation on the example of the Dover Strait (1 hour)
Seminar
1. Modelling a maritime transport system with increased collision risk – a case study</td></tr>
</table>

<table>
<tr><td>Types of teaching</td><td colspan="3">☒ lectures
☒seminars and workshops
☒exercises
□ on line in full
□ mixed e-learning
□ fieldwork</td><td colspan="3">□ independent tasks
□ multimedia
□ laboratory
□ mentoring work
□ (other, write in)</td></tr>
<tr><td>Student obligations</td><td colspan="6"></td></tr>
<tr><td rowspan="5">Monitoring student work (enter the share in ECTS points for each activity so that the total number of ECTS points corresponds to the subject credit value)</td><td>Attending classes</td><td>0,875</td><td>Research</td><td></td><td>Practical work</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(other, write in)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar paper</td><td>3</td><td>(other, write in)</td><td></td></tr>
<tr><td>Colloquia</td><td></td><td>Oral exam</td><td>1,125</td><td>(other, write in)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(other, write in)</td><td></td></tr>
<tr><td>Grading and evaluating student work during classes and at the final</td><td colspan="6">The doctoral student is required to attend lectures, seminars and exercises and independently participate in defending the seminar paper.
The doctoral student is assessed orally.</td></tr>
<tr><td rowspan="8">Required literature (available in the library and through other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td colspan="2">Availability through other media</td></tr>
<tr><td colspan="3">Bošnjak, R.: Sinteza sustava upravljanja plovidbom u e-navigaciji, Doktorska disertacija, Sveučilište u Zagrebu, Fakultet prometnih znanosti, Zagreb 2017.</td><td>1</td><td colspan="2"></td></tr>
<tr><td colspan="3">Kezić, D.: Sprječavanje potpunog zastoja u sustavima s diskretnim događajima primjenom Petrijevih mreža, Doktorska disertacija, Sveučilište u Zagrebu, Fakultet elektrotehnike i računarstva, Zagreb, 2004.</td><td>1</td><td colspan="2"></td></tr>
<tr><td colspan="3">Vidan, P.: Model povećanja sigurnosti plovidbe na unutarnjim plovnim putovima, Doktorska disertacija, Sveučilište u Zagrebu, Fakultet prometnih znanosti, Zagreb, 2010.</td><td>1</td><td colspan="2"></td></tr>
<tr><td colspan="3">Gudelj A: Optimalizacija sustava s diskretnim događajima primjenom Petrijevih mreža i genetskih algoritama, Doktorska disertacija, Sveučilište u Zagrebu, Fakultet organizacije i informatike, Varaždin, 2010.</td><td>1</td><td colspan="2"></td></tr>
<tr><td colspan="3">David, R., Alla H., Discrete, Continuous, and Hybrid Petri Nets, Springer, Berlin Heidelberg New York, 2010.</td><td>1</td><td colspan="2"></td></tr>
<tr><td colspan="3">Weintrit, A. (2011). "Navigational Systems and Simulator", Gdynia Maritime University, Gdynia, Poland, p. 55-63.</td><td></td><td colspan="2"></td></tr>
<tr><td>Supplemental literature</td><td colspan="6">1. Porathe, T.; Lützhöft, M.; Praetorius, G. (In press). Communicating intended routes in ECDIS, Evaluating technological change, Journal of Accident Analysis and Prevention, Elseviers (available online from January 2013).</td></tr>
</table>

	2. Lützhöft, M., Porathe, T., Jenvald, J. & Dahman, J. (2010). *System Simulations for Safety*. In O. Turans, J. Bos, J. Stark & J. L. Colwell (Eds.) *Proceedings of the International Conference on Human Performance at Sea*, p. 3. Glasgow: University of Strathclyde.
Quality assurance methods that ensure the acquisition of established learning outcomes	• Evaluation of results in accordance with the specified learning outcomes • Feedback from students through a student survey • Teacher self-evaluation • Institutional and extra-institutional checks
Other (according to the proposer's opinion)	

SUBJECT NAME	**Methodology of maritime operations design**						
Code	DS16	Year of study	1				
Subject holder/s	Asst. Prof. Ivica Pavić	Point value (ECTS)					
Collaborators		Teaching method (hours per semester)	L	S	AV	LV	KV
			20	0	0	0	0
Subject status	Elective	Percentage of e-learning					
SUBJECT DESCRIPTION							
Subject objectives	• Study of theoretical approaches to operational design • Analysis of the practical application of operational design in naval operations • Determination of complementarity and interdependence between operational design and operational planning and execution of campaigns and major operations • Linking the doctrine and practice of operational art in the function of developing elements of operational design.						
Subject enrolment requirements and entry competencies required for the	Completed graduate university studies in Nautical or Naval Studies						
Expected learning outcomes at the subject level (4-10 learning outcomes)	After successfully completing the subject, doctoral students will be able to: 1. Independently search and analyse scientific literature in the field of operational design. 2. Apply appropriate doctrinal principles in the research, development and practical application of operational design in contemporary maritime operations. 3. Write and present a scientific paper in the interdisciplinary field of military-defence and security-intelligence sciences and arts. 4. Use and critically evaluate methods for determining elements of operational design and the impact and characteristics of new technologies on determining these elements.						

The subject content is elaborated in detail according to the class schedule	• Theoretical approaches to operational design • Analysis of the classical approach to operational design • Development of the operational idea through elements of the classical approach to operational design • Analysis of the theoretical foundations of the effects-based operational design approach • Identification of elements of operational planning, determination and action on hubs and links of the system, and development of main activities within the planning of operations based on effects • Analysis of theoretical foundations of system operational design • Determining relations and relations between entities and influencing relations and connections within complex adaptive systems with disSubjects of system operational design • Examining and analysing the application of operational design in maritime operations and the impact on operational planning and implementation of operations
Types of teaching	☒ lectures ☒seminars and workshops □ exercises □ on line in full □ mixed e-learning □ fieldwork ☒independent tasks □ multimedia □ laboratory ☒mentoring work □ (other, write in)
Student obligations	Active participation in all forms of teaching: lectures, consultations, literature searches, independent work on analysing the assigned problem.

Monitoring student work (enter the share in ECTS points for each activity so that the total number of ECTS points corresponds to the subject credit						
	Attending classes	1,5	Research	1,5	Practical work	1,5
	Experimental work		Report		(other, write in)	
	Essay		Seminar paper	1,5	(other, write in)	
	Colloquia		Oral exam		(other, write in)	
	Written exam		Project		(other, write in)	

Grading and evaluating student work during classes and at the final exam	The grade is determined as the mean value: • evaluation of the quality of the written scientific paper and • evaluation of the presentation of the scientific paper.

Required literature (available in the library and through other media)	**Title**	**Number of copies in the**	**Availability through other media**
	Planner's Handbook for Operational Design, Joint Chiefs of Staff, Joint Staff, J-7, Joint and Coalition Warfighting, Suffolk, Virginia, 2011.		
	Naveh, Shimon: *In Pursuit of Military Excellence: The Evolution of Operational Theory*, London, Frank Cass, 1997.		
	Sorrells, William T., et. al.: *Systemic Operational Design: An introduction*, School of Advanced Military Studies United States Army Command and General Staff CollegeFort Leavenworth, Kansas, 2005.		
	Vego, Milan: *Joint Operational Warfare – Theory and Practice*, Naval War College, Newport, Rhode Island, 2007.		

	Warden, John A. III: *The Air Campaign: Planning for Combat*, Washington, DC: National Defence University Press, 1988.		
Supplemental literature	1. Banach, S. J., Ryan, A.: *The Art of Design, A Design Methodology*, Military Review, 2009US Army Combined Arms Centre, Fort Leavenworth, Kansas, 2009. 2. Dalton, L. C.: *Systemic Operational Design: Epistemiological Bumpf or the Way Ahead for Operational Design? A monograph*, School of Advanced Military Studies, US Army Command and General Staff College, Fort Leavenworth, Kansas, 2006. 3. Kober, A.: The Israeli Defense Forces in the Second Lebanon War: Why the Poor Performance?, *The Journal of Strategic Strudies*, Vol. 31. No. 1, London, New York, 2008. 4. McGlade, P. E.: *Effect-Based Approach to Operations Versus Systemic Operational Design: Is there a Difference?*, Graduate Research Project, Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio, 2006. 5. Pavić, I.: *Izraelski pristup operativnom dizajnu u kampanji protiv Hezbollaha 2006.*, Diplomski rad, Zapovjedno-stožerna škola "Blago Zadro", Hrvatsko vojno učilište, Zagreb, 2010. 6. Pavić, I., Mišković, J., Pomorska blokada tijekom Izraelsko-Libanonskog sukoba 2006., Izvorni znanstveni članak, *Adrias*, Zbornik zavoda za znanstveni i umjetnički rad Hrvatske akademije znanosti i umjetnosti, Vol. 17, 2010, Zagreb – Split, 2010. 7. Vego, M.: *A Case against Systemic Operational Design*, Joint Forces Quarterly, Issue 53, National Defense University Press, Washington DC, 2009. 8. Vego, M.: *Systems versus Classical Approach to Warfare*, Joint Forces Quarterly, Issue 52, National Defense University Press, Washington DC, 2009. 9. Vego, M.: *Effect-Based Operations: A Critique*, Joint Forces Quarterly, Issue 41, National Defence University Press, Washington DC, 2006.		
Quality assurance methods that ensure the acquisition of established learning outcomes	• Evaluation of results in accordance with the specified learning outcomes • Feedback from students through a student survey • Teacher self-evaluation • Institutional and extra-institutional checks		
Other (according to the proposer's opinion)			

<table>
<tr><td>SUBJECT NAME</td><td colspan="5">Maritime route planning</td></tr>
<tr><td>Code</td><td>DS17</td><td>Year of study</td><td colspan="3">1</td></tr>
<tr><td>Subject holder/s</td><td>Assoc. Prof. Zvonimir Lušić</td><td>Point value (ECTS)</td><td colspan="3">7</td></tr>
<tr><td rowspan="2">Collaborators</td><td rowspan="2"></td><td rowspan="2">Teaching method (hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>15</td><td>15</td><td>0</td><td>0</td></tr>
<tr><td>Subject status</td><td>Required</td><td>Percentage of e-learning</td><td colspan="3"></td></tr>
<tr><td colspan="6">SUBJECT DESCRIPTION</td></tr>
<tr><td>Subject objectives</td><td colspan="5">Apply scientific methods in solving complex problems of organization and supervision of maritime navigation and improvement of safety measures at sea.</td></tr>
<tr><td>Subject enrolment requirements and entry competencies required for the</td><td colspan="5">Completed graduate studies in Maritime Studies or another major that includes at least the contents of STCW II/2.</td></tr>
<tr><td>Expected learning outcomes at the subject level (4-10 learning outcomes)</td><td colspan="5">• Application of quantitative and qualitative methods in ship collision and grounding assessments.
• Independently analyse ship navigation flows, determine movement distributions and ship traffic structure, and present research results.
• Critically assess elements of maritime international and national legal regulations, especially in the area of regulation of maritime navigation, protection of human life at sea, protection of property and prevention of pollution of the marine environment.
• Analyse the usability of complex navigation and communication systems and devices in maritime navigation monitoring systems, and the possibilities of improving them.
• Develop models for optimizing maritime travel and navigation, and systems for improving maritime safety in general.</td></tr>
<tr><td>The subject content is elaborated in detail according to the class schedule</td><td colspan="5">• Spatial movement of ships and characteristics of the navigation flow (direction, speed, traffic volume, density, traffic structure, distribution).
• Statistical processing of data on ship movement (AIS, radar, optical systems).
• Models for assessing ship collisions
• Models for assessing ship grounding
• Principles governing navigation - international and national regulations
• VTS systems; establishment, organization, examples, contribution to safety
• Technical support for ships in navigation
• Ship detection systems, communication and remote-control capabilities
• Traffic management in ports and on approach routes
• Maritime characteristics of ships
• Principles of ship voyage planning and its optimization, models for optimizing maritime voyage
• Time-based ship guidance
• Navigation management in special circumstances; war zones, areas of pirate attacks, interruption of communication and navigation systems; navigation management of special ships and objects at sea.
• Management of autonomous vessels.</td></tr>
</table>

Types of teaching	☒ lectures ☒seminars and workshops □ exercises □ on line in full □ mixed e-learning □ fieldwork		☒independent tasks □ multimedia □ laboratory ☒mentoring work □ (other, write in)			
Student obligations	Attending classes, researching, writing a seminar paper					
Monitoring student work (enter the share in ECTS points for each activity so that the total number of ECTS points corresponds to the subject credit value)	Attending classes	0,375	Research	5	Practical work	
	Experimental work		Report		(other, write in)	
	Essay		Seminar paper	0,375	(other, write in)	
	Colloquia		Oral exam	1,25	(other, write in)	
	Written exam		Project		(other, write in)	
Grading and evaluating student work during classes and at the final exam	The student is required to attend lectures, complete independent assignments/research, and prepare, present, and defend a seminar paper.					

	Title	Number of copies in the	Availability through other media
Required literature (available in the library and through other media)	Kristiansen, S.: Maritime Transportation: Safety Management and Risk Analysis, Elsevier-Butterworth-Heinemann, 2005.	1	
	Kos, S.; Zorović, D.; Vranić, D.: Terestrička i elektronička navigacija, Pomorski fakultet u Rijeci, Rijeka, 2010.	1	
	Mazaheri, A.: Probabilistic modeling of ship grounding, Helsinki University of tehnology-Faculty of Engineering and Architecture, 2009.		YES
	Zec, D.: Planiranje pomorske plovidbe, Pomorski fakultet u Rijeci, Rijeka, 1997.	1	
	Hansen, P.F.: Basic Modelling Principles for prediction of collision and grounding frequencies-IWRAP MK II, Technical University of Denmark, 2008.		YES
	Guidance Note on the Preparation of Proposals on Ships' Routeing Systems and Ship Reporting Systems, IMO (www.imo.org)		YES
	Ships Routing, IMO	1	
	IALA VTS manual, IMO, 2012		YES
	Andersson, A.: Multi-objective optimisation of ship routes-Master's thesis, Chalmers University of Technology, 2015.		YES
	E-navigation Strategy Implementation Plan (SIP); IALA Guideline on Shore-side portrayal ensuring harmonisation with e-Navigation related information		YES

Supplemental literature	Bowditch, N.: The American Practical Navigator, DMAHTC, Maryland, 2002. Benković, F.; Piškorec, M.; Lako, Lj..; Čepelak, K.; Stajić, D.: Terestrička i elektronska navigacija, Hidrografski Institut Ratne mornarice, Split, 1986. Zec, D.: Sigurnost na moru, Pomorski fakultet u Rijeci, Rijeka, 2001. Risk assesment applications for the marine and offshore oil and gas industries, ABS, 2000. Maber, M.H.: Risk and safety in Civil Engineering, Swiss Federal Institute of tehnology, Zurich. Kopacz, Z.; Morgas, W.; Urbanski, J.: The Maritime Safety System, its Main Components and Elements, The Journal of Navigation, Vol 54, No 2, The Royal Institute of Navigation, United Kingdom, 2001., str. 199-211. Ruihua LU; Turan, O.; Boulougouris, E.: Voyage optimisation: prediction of ship specific fuel consumption for energy efficient shipping, Low Carbon Shipping Conference, London 2013.
Quality assurance methods that ensure the acquisition of established learning outcomes	• Evaluation of results in accordance with the specified learning outcomes • Feedback from students through a student survey • Teacher self-evaluation • Institutional and extra-institutional checks
Other (according to the proposer's opinion)	

2.16. List of teachers and associates by subject

Subject	Teachers and associates
Scientific research methodology	Alen Soldo, Hrvoje Dodig
Organization of scientific projects and basics of bibliometrics	Alen Soldo, Hrvoje Dodig
Maritime expert systems	Hrvoje Dodig
Intelligent transport systems in maritime studies	Pero Vidan
Strength and vibrations of marine propulsion systems	Nenad Vulić
Modelling and simulation of marine propulsion systems	Nikola Račić
Energy efficiency of marine systems	Maja Krčum
Technical supervision of sea-going vessels	Ivan Komar
Mathematical methods in maritime studies	Tatjana Stanivuk
Modelling and optimization of maritime transport systems	Danko Kezić, Anita Gudelj
Energy efficiency in maritime transport	Zdeslav Jurić
Advanced algorithms in traffic control systems	Igor Vujović, Joško Šoda, Petar Matić
Sustainable maritime transport system from the aspect of ecology and environmental protection	Gorana Jelić Mrčelić, Merica Slišković
Forensic hydrography, models and simulations	Josip Kasum
Synthesis of control systems in high-risk sea areas	Rino Bošnjak, Danko Kezić
Methodology of maritime operations designing	Ivica Pavić
Maritime route planning	Zvonimir Lušić

2.17. Teacher data

Title, name and surname	**Full Prof. Alen Soldo**
Subject taught in the proposed study programme	Scientific research methodology Organization of scientific projects and basics of bibliometrics
GENERAL INFORMATION	
Address	Podčeline 47, Podstrana 21312
Telephone	098 602690
E-mail address	soldo@unist.hr
Personal website	http://more.unist.hr/Organizacija/Imenik/tabid/633/agentType/View/PropertyID/1170/Default.aspx
Year of birth	1970.
Personal identification number from the Register of Scientists	243634
Scientific or artistic title and date of last election	Scientific advisor, 2013.
Scientific-teaching, artistic-teaching or teaching title and date of last election	Full professor, May 2013.
Field and field of election to scientific or artistic title	Field of biotechnical sciences, field of agronomy
DATA ON CURRENT EMPLOYMENT	
Institution of employment	University of Split
Date of employment	1. December 2006.
Job title (professor, researcher, associate, etc.)	Professor
Field of work	Marine resource management, underwater technologies and research
Function	Head of postgraduate study
EDUCATIONAL DATA – Highest degree achieved	
Title	PhD
Institution	Faculty of Agriculture Zagreb
Place	Zagreb
Date	2004.
DATA ABOUT ADVANCED TRAINING	
Year	1999; 2002;
Place	Szczecin, Poland; Nexo, Denmark
Institution	Faculty of Agronomy Szczecin; Nexo Vodbinderi
Field of study	Marine resource exploitation technology
NATIVE LANGUAGES AND FOREIGN LANGUAGES	
Native language	Croatian
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	English, 5 (excellent)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	Italian, 3 (good)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	-

SUBJECT COMPETENCES	
Previous experience in teaching similar subjects (state the name of the subject, the study programme in which it was/is being taught, and the level of the study programme)	Undergraduate • Fishing tools and techniques • Responsible fishing and its regulation • Catchability, selectivity and design of fishing gear • Underwater research techniques Graduate • Commercial fishing at sea • Responsible fishing and its regulation • Fishing and fish stock fluctuations • Catchability, selectivity and design of fishing gear • Underwater research techniques • Sport and recreational fishing at sea Postgraduate • Methods of scientific research • Responsible fishing and its regulation • Underwater research techniques
Authorship of university/college textbooks in the subject area	• Nieto, A., Ralph, G.M., Comeros-Raynal, M.T., Kemp, J., García Criado, M., Allen, D.J., Dulvy, N.K., Walls, R.H.L., Russell, B., Pollard, D., García, S., Craig, M., Collette, B.B., Pollom, R., Biscoito, M., Labbish Chao, N., Abella, A., Afonso, P., Álvarez, H., Carpenter, K.E., Clò, S., Cook, R., Costa, M.J., Delgado, J., Dureuil,M., Ellis, J.R., Farrell, E.D., Fernandes, P., Florin, A-B., Fordham, S., Fowler, S., Gil de Sola, L., Gil Herrera, J., Goodpaster, A., Harvey, M., Heessen, H., Herler, J., Jung, A., Karmovskaya, E., Keskin, C., Knudsen, S.W., Kobyliansky, S., Kovačić, M., Lawson, J.M., Lorance, P., McCully Phillips, S., Munroe, T., Nedreaas, K., Nielsen, J., Papaconstantinou, C., Polidoro, B., Pollock, C.M., Rijnsdorp, A.D., Sayer, C., Scott, J., Serena, F., Smith-Vaniz, W.F., Soldo, A., Stump, E. and Williams, J.T. 2015. European Red List of Marine Fishes. European Commission. Edited by European Commission & International Union for Conservation of Nature: 90 pp. • Soldo, A. 2014. Vrste sportsko-rekreacijskog ribolova / Species of sport and recreational fisheries. Sveučilište u Splitu: 208 pp. • Soldo. A., Valić, Z., Glavičić, I., Jurman, B.,Drviš, I. 2013. Ronjenje / Diving. Sveučilište u Splitu & HOA: 288 pp. • Cetinić, P., Soldo, A. 2010. Ribarski brod i luka : tehnologija iskorištavanja / Fishing vessel and fishing harbour: technology of exploitation. Književni krug, Split: 495 pp. • Lipej, L., De Maddalena, A., Soldo, A. 2004. Sharks of the Adriatic Sea. Knjižnica Annales Majora, Koper: 254 pp.
Professional, scientific and artistic works published in the last five years in the subject area (maximum 5 references)	• Soldo, A. & Glavičić, I. 2017. A comparison of thee techniques for underwater visual sampling of fish communities. Contributions on the Theory of Fishing Gears and Related Marine Systems, Vol. 10 (ed. Takagi, T. & Pachen, M.) Shaker Verlag Aachen: 217-225

	• Fernandes, Paul G.; Ralph, Gina M.; Nieto, Ana; García Criado, Mariana; (…); Soldo, Alen; Keskin, Çetin; (…); Delgado, João; Dulvy, Nicholas K.; Carpenter, Kent E. 2017. Coherent assessments of Europe's marine fishes show regional divergence and megafauna loss. Nature Ecology & Evolution, vol 1, 0170. DOI: 10.1038/s41559-017-0170 • Soldo, A. & Pejdo, D. 2016. Usporedba sportskog udičarskog ribolova za vrijeme i izvan natjecanja. Sveučilište u Splitu: 67 pp. • Farrugio, H. & Soldo, A. 2014. Status and conservation of Fisheries in the Sicily Channel / Tunisian plateau. UNEP-MAP-RAC/SPA. Draft internal report for the purposes of the Mediterranean Regional Workshop to Facilitate the Descriptin of Ecologically or Biologically Significant Marine Areas. Malaga, Spain 7-11 April: 64 pp. • Soldo, A., & Bosnić, N. 2013. A comparative analysis of metiers for Croatian pelagic fleet fishing European anchovy, Engraulis encrasicolus. Contributions on the Theory of Fishing Gears and Related Marine Systems, Vol. 8 (ed. Pachen, M.) Shaker Verlag Aachen: 233-242
Professional and scientific papers on teaching methodology and quality published in the last five years (maximum 5 references)	Soldo, A. 2017. Sports Fishing Coaches' Handbook. Soldo, A. 2014. Handbook for instructors and managers of sport and recreational diving.
Professional, scientific and artistic projects in the subject area that were carried out in the last five years (maximum 5 references)	Project leader: 2014. - Comparison of competitive and non-competitive sport fishing 2015. - Student Business e-Academy. Erasmus+ programme 2016-2017. Mapping Natura 2000 marine habitats in Split-Dalmatia County 2018-… Capacity building for Blue Growth and curriculum development of Marine Fishery in Albania Participation in international projects: 2014-2016 Establishment of a European Red List of Habitats. IUCN- International Union for Conservation of Nature, Alterra, Nature Bureau. ENV.B.3/SER/2013/0025
Within which programme and to what extent did the holder acquire methodological-psychological-didactic-pedagogical competencies?	By participating in about a hundred international conferences and workshops and leading 16 scientific and professional projects.
RECOGNITIONS AND AWARDS	
Recognitions and awards for teaching and scientific work/artistic work	• 2012. Annual Award for the Promotion of Maritime Sciences of the Ministry of Maritime Affairs, Transport and Infrastructure • 2017. Annual award for science in the field of biotechnical sciences from the University of Split

Title, name and surname	**Asst. Prof. Hrvoje Dodig**
Subject taught in the proposed study programme	Maritime Expert Systems Scientific Research Methodology Organization of Scientific Projects and Basics of Bibliometrics
GENERAL INFORMATION	
Address	Podglavica 8, Split
Telephone	098 1909 426
E-mail address	hrvoje.dodig@pfst.hr
Personal website	www.hdodig.com
Year of birth	1972
Personal identification number from the Register of Scientists	358544
Scientific or artistic title and date of last election	Research associate, 14.02.2018.
Scientific-teaching, artistic-teaching or teaching title and date of last election	Assistant professor, 01.05.2018.
Field and field of election to scientific or artistic title	Research associate in the field of technical sciences, electrical engineering, electronics
DATA ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Maritime Studies, University of Split
Date of employment	10.12.2016.
Job title (professor, researcher, associate, etc.)	Assistant professor
Field of work	Electronics, Mechatronics
Function	
EDUCATIONAL DATA – Highest degree achieved	
Title	Doctor of Science
Institution	Wessex Institute of Technology, University of Wales, UK
Place	Ashurst, New Forest, UK
Date	12. November 2012.
ADVANCED TRAINING	
Year	2018
Place	Gdynia, Poland
Institution	Polish Naval Academy
Field of study	Electrical engineering
NATIVE LANGUAGES AND FOREIGN LANGUAGES	
Native language	Croatian
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	English, 5 (excellent)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	
SUBJECT COMPETENCES	
Previous experience in teaching similar subjects (state the name of the	1. "Mechatronics", graduate study of Maritime Electrical and Information Technology (MEIT), Faculty of Maritime Studies, Split

study programme in which it was/is being taught, and the level of the study programme)	2. "Cross-platform programming", graduate study, Maritime Electrical and Information Technology (MEIT), Maritime Faculty Split 3. "Maintenance of ship electro-technical systems", undergraduate study, Maritime Electronic and Information Technology (MEIT), Maritime Faculty Split 4. "Electronic circuits and elements", undergraduate study of maritime electro-technical and IT technology (MEIT), Maritime Faculty Split
Authorship of university/college textbooks in the subject area	
Professional, scientific and artistic works published in the last five years in the subject area (maximum 5 references)	1. Poljak, Dragan; Šesnić, Silvestar; Cvetković, Mario; Šušnjara, Anna; Dodig, Hrvoje; Lallechere, Sebastien; Drissi, Khalil El Khamlichi: „Stochastic Collocation Applications in Computational Electromagnetics“, Mathematical problems in engineering, 2018 2. Cvetković, Mario; Dodig, Hrvoje; Poljak, Dragan: „A Study on the use of Compound and Extracted Models in the High Frequency Electromagnetic Exposure Assessment“, Mathematical problems in engineering, 2017 3. Dodig, Hrvoje, „A boundary integral method for numerical computation of radar cross section of 3D targets using hybrid BEM/FEM with edge elements“, Journal of computational physics. 348 (2017) ; pp. 790-802 4. Dodig, Hrvoje; Lallechere, S.; Bonnet, P.; Poljak, Dragan; El Khamlichi Drissi, K.: „Stochastic sensitivity of the electromagnetic distributions inside a human eye modeled with a 3D hybrid BEM/FEM edge element method.“, Engineering analysis with boundary elements. 49 (2014) ; pp. 48-62 5. Poljak, Dragan; Čavka, Damir; Dodig, Hrvoje; Peratta, Cristina; Peratta, Andres: „On the use of the boundary element analysis in bio-electromagnetics“, Engineering analysis with boundary elements. 49
Professional and scientific papers on teaching methodology and quality published in the last five years (maximum 5 references)	
Professional, scientific and artistic projects in the subject area that were carried out in the last five years (maximum 5 references)	
Within which programme and to what extent did the holder acquire methodological-psychological-didactic-pedagogical competencies?	
RECOGNITIONS AND AWARDS	
Recognitions and awards for teaching and scientific	

Title, name and surname	**Assoc. Prof. Pero Vidan**
Subject taught in the proposed study programme	Intelligent transport systems in maritime studies
GENERAL INFORMATION	
Address	Don Frane Bulića 68, 21210 Solin
Telephone	+385 913 807004
E-mail address	pvidan@pfst.hr
Personal website	http://www.pfst.unist.hr/hr/o-fakultetu-hr/ustroj/nastavnici-i-suradnici?view=profesor&id=7
Year of birth	1976.
Personal identification number from the Register of Scientists	288456
Scientific or artistic title and date of last election	Scientific advisor, 2012.
Scientific-teaching, artistic-teaching or teaching title and date of last election	Associate professor, 2013.
Field and field of election to scientific or artistic title	Technical field, traffic and transport technology
DATA ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Maritime Studies in Split
Date of employment	1. 3. 2006.
Job title (professor, researcher, associate, etc.)	associate professor
Field of work	technical area
Function	vice dean for science
EDUCATIONAL DATA – Highest degree achieved	
Title	Doctor of Science
Institution	Faculty of Transport Sciences Zagreb
Place	Zagreb
Date	3.7.2010.
ADVANCED TRAINING	
Year	
Place	
Institution	
Field of study	
NATIVE LANGUAGES AND FOREIGN LANGUAGES	
Native language	Croatian
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	English, 5 (excellent)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	German, 3 (good)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	
SUBJECT COMPETENCES	
Previous experience in teaching similar subjects (state the name of the subject, the study programme in which it was/is being taught, and the level of the study programme)	Doctoral study in Maritime Studies (MFRI): Rescue at sea Doctoral study (Univ. of Montenegro): Rescue at sea Graduate study in Maritime Nautical Studies: Rescue at sea Undergraduate study in Maritime Nautical Studies, Marine Engineering and Marine Electrical Engineering and Electronics: Safety at sea, Work organization and management on board ship

Authorship of university/ college textbooks in the subject area	
Professional, scientific and artistic works published in the last five years in the subject area (maximum 5 references)	1. Vidan, P.; Kasum, J. Security of Hazmat Transports by Inland Waterways // *Security Aspects of Uni-and Multimodal Hazmat Transportation Systems* / Reniers L.L., Genserik ; Zamparini, Luca (ur.). Weinheim : Wiley-VCH, 2012. Str. 71-89. 2. Vidan, P.; Dlabač, T.; Jerković, G. Familiarisation Aboard Ships of Croatian and Montenegrin Officers. // *Transactions on Maritime Science*. 4 (2015) , 2; 113-118 (članak, znanstveni). 3. Vidan, P.; Kezić, D.; Gudelj, A. Management of Lock Navigation to Reduce Queuing. // *Brodogradnja : časopis brodogradnje i brodograđevne industrije*. 64 (2013) , 2; 1-18 (članak, znanstveni). 4. Vidan, P.; Grzadziela, A.; Bošnjak, R. Proposal of Measures for Increasing the Safety Level of Inland Navigation. // *Transactions on Maritime Science*. 1 (2012) , 2; 85-88 (članak, znanstveni). 5. Vidan, P.; Stanivuk, T.; Bielić, T. Effectiveness and Ergonomics of Integrated Navigation System. // *Transactions on Maritime Science*. 1 (2012) , 1; 17-21 (članak, znanstveni).
Professional and scientific papers on teaching methodology and quality published in the last five years (maximum 5 references)	
Professional, scientific and artistic projects in the subject area that were carried out in the last five years (maximum 5 references)	1. TEMPUS “Modernizing and harmonizing maritime education in Montenegro and Albania” MArED Leader: for PFST and UNIST 2013-2017 2. MZOS number 1352586-2588 Integration of the intermodal water transport system in the European transport network (2007-2012) led by prof. dr. sc. Natalija Jolić. 3. IPA 3 c Project Science and Innovation: "Technology transfer infrastructure in the Croatian Adriatic Region- TTAdria" 2013-2016 4. Maritime study for concession fields-fish farms in the Lamjan zone (G, B, VŠ1, VŠ2, VŠ3), client Cromaris d. d., contractor Faculty of Maritime Affairs in Split, leader doc. dr. sc. Zvonimir Lušić, contractors doc. dr. sc. Zvonimir Lušić, Danijel Pušić, mag. ing. naut., assoc. prof. dr. sc. Pero Vidan, assoc. prof. dr. sc. Merica Slišković, Split, 2014. 5. Maritime study for the installation of a pontoon for the reception of seaplanes on the part of the Prince Domagoj Coast in the Split City Port, client European Coastal Airlines d.o.o., presenters: assoc. prof. dr. sc. Pero Vidan, assoc. prof. dr. sc. Zvonimir Lušić, Danijel Pušić, mag. ing. naut., assoc. prof. dr. sc. Merica Slišković, Ružica Popović, mag. ing., leader: izv. prof. dr. sc. Pero Vidan, Split, 2015.

Within which programme and to what extent did the holder acquire methodological-psychological-didactic-pedagogical competencies?	
NITIONS AND AWARDS	
Recognitions and awards for teaching and scientific work/artistic work	Acknowledgment of the University of Montenegro 2014, Acknowledgment of the Military Maritime Agency from Gdynia (Poland).

Title, name and surname	**Full Prof. Nenad Vulić**
Subject taught in the proposed study programme	Strength and vibrations of marine propulsion systems
GENERAL INFORMATION	
Address	Sukoišanska 37, 21000 Split
Telephone	021 321 447, 091 517 0660
E-mail address	nenad.vulic@pfst.hr
Personal website	tkojetko.irb.hr/znanstvenikDetalji.php?sifznan=19239
Year of birth	1960.
Personal identification number from the Register of Scientists	184346
Scientific or artistic title and date of last election	scientific advisor, 21. January 2009.
Scientific-teaching, artistic-teaching or teaching title and date of last	full professor tenured, 18. December 2013.
Field and field of election to scientific or artistic title	field of technical sciences, field of mechanical engineering
DATA ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Maritime Studies, University of Split
Date of employment	1. August 2015.
Job title (professor, researcher, associate, etc.)	professor
Field of work	Marine engineering
Function	-
EDUCATIONAL DATA – Highest degree achieved	
Title	dr. sc.
Institution	Faculty of Mechanical Engineering and Naval Architecture
Place	Zagreb
Date	27. October 1995.
ADVANCED TRAINING	
Year	-
Place	-
Institution	-
Field of study	-
NATIVE LANGUAGES AND FOREIGN LANGUAGES	
Native language	Croatian
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	English, 5 (excellent)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	German, 3 (good)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	-
SUBJECT COMPETENCES	
Previous experience in teaching similar subjects (state the name of the subject, the study programme in which it was/is being taught, and the level of the study programme)	Ship Propulsion System (graduate study in Naval Engineering), Process Modelling and Simulation (graduate study in Naval Engineering), Mechanisms and Vibrations (undergraduate study in Naval Engineering), Machine Elements (undergraduate study in Naval Architecture), Machine Elements 1 and 2 (professional study in Mechanical Engineering)
Authorship of university/college textbooks in the subject area	Technical rules of the Croatian Bar Association (not textbooks, but used as such in Subject teaching):

	Rules for the Classification of Ships, Part 7-Machinery Installation, Croatian Register of Shipping, Split, 2013. Rules for the Classification of Ships, Part 9-Machinery Installation, Croatian Register of Shipping, Split, 2015.
Professional, scientific and artistic works published in the last five years in the subject area (maximum 5 references)	1. N. VULIĆ, IGOR ŠULJIĆ, IVOR ŠULJIĆ, *Comparison of IACS Classification Societies Propeller Strength Calculations*, 18th International Conference on Transport Science (ICTS 2018), June 14th-15th 2018, Conference Proceedings, Portorož, 2018. pp. 409-415. 2. D. MRSIĆ, M.VULIĆ, N. VULIĆ, *Loading factors within the strength calculation procedure for involute marine gears with parallel axes*, Contemporary Issues in Economy & Technology (CIET 2018), June 1st-2nd 2018, Conference Proceedings, Split, 2018. pp. S245- S256. 3. N. VULIĆ, I. KOMAR, P. JURIŠIĆ, *Selection and evaluation of marine shafting torsional vibrations calculation software*, 7th International Maritime Science Conference (IMSC 2017), April 20th-21st 2017, Book of Proceedings, Solin, 2017. pp. 221-229. 4. N. VULIĆ, Đ. DOBROTA, I. KOMAR, *Damping and excitation in the torsional vibrations calculation of ship propulsion systems* (paper TR03_ID73), Contemporary Issues in Economy & Technology (CIET 2016), June 16th- 18th 2016, Conference Proceedings, Split, 2016. pp. S165- S174. 5. KOMAR, N. VULIĆ, L. ROLDO, *Hydrodynamic and elasto-hydrodynamic lubrication models to verify performance of marine propulsion shafting*, Transactions of FAMENA, 37(2013)1, str. 15-27.
Professional and scientific papers on teaching methodology and quality published in the last five years (maximum 5 references)	- ... , *Training Syllabi for Plan Approval Staff,* Croatian register of Shipping, Split, 2013
Professional, scientific and artistic projects in the subject area that were carried out in the last five years (maximum 5 references)	Shaft centering calculations with verification and validation, and torsional vibration calculations with verification and validation for a total of 24 newbuilds/ships in service under the class and technical supervision of the Croatian Register of Shipping Shaft centering calculations for 2 ships in DIV Brodosplit IACS Machinery Panel project PM11918 development of harmonized requirements UR M56 Marine gears – load capacity of involute parallel axis spur and helical gear (Rev. 2, Oct 2013), International Association of Classification Societies, London, 2011-2013.
Within which programme and to what extent did the holder acquire methodological-psychological-didactic-pedagogical competencies?	Participation in training for teachers and administrative staff as part of the EU project ME4Catalogue (Mechanical Engineering for Catalogue) at FESB 2014.
RECOGNITIONS AND AWARDS	
Recognitions and awards for teaching and scientific work/artistic work	-

Title, name and surname	**Assoc. Prof. Zvonimir Lušić**
Subject taught in the proposed study programme	Maritime route planning
GENERAL INFORMATION	
Address	Vinkovačka 13, Trogir
Telephone	-
E-mail address	zlusic@pfst.hr
Personal website	-
Year of birth	1971.
Personal identification number from the Register of Scientists	288482
Scientific or artistic title and date of last election	Research associate, 14.9.2011.
Scientific-teaching, artistic-teaching or teaching title and date of last	Associate Professor, 14.12.2016.
Field and field of election to scientific or artistic title	field of technical sciences, field of traffic and transport technologies, branches of maritime and river transport
DATA ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Maritime Studies, University of Split
Date of employment	1. 5. 2005.
Job title (professor, researcher, associate, etc.)	instructor
Field of work	maritime navigation
Function	Head of the Department of Nautical Sciences
EDUCATIONAL DATA – Highest degree achieved	
Title	Doctor of Science
Institution	Faculty of Maritime Studies in Rijeka
Place	Rijeka
Date	19.7. 2010.
ADVANCED TRAINING	
Year	2013.
Place	Portorož
Institution	Faculty of Maritime Studies Portorož
Field of study	Application of navigation simulators in research and teaching
NATIVE LANGUAGES AND FOREIGN LANGUAGES	
Native language	Croatian
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	English, 3 (good)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	
SUBJECT COMPETENCES	
Previous experience in teaching similar subjects (state the name of the subject, the study programme in which it was/is being taught, and the level of the study programme)	• Navigation I, II, III, IV, Maritime Nautical Studies, two-year/four-year university study • Maritime Navigation Systems and Processes I, II, III, IV, Maritime Systems and Processes, four-year university study • Terrestrial Navigation, Maritime Nautical Studies/Maritime Management/Maritime Technologies of Yachts and Marinas/Maritime Systems and Processes, undergraduate university studies

	• Astronomical Navigation, Maritime Nautical Studies/Maritime Management/Maritime Technologies of Yachts and Marinas/Maritime Systems and Processes, undergraduate and graduate university studies
Authorship of university/college textbooks in the subject area	Lušić, Z.: Astronomical navigation – script, Faculty of Maritime Studies in Split, 2012. Lušić, Z.: Terrestrial navigation – authorized lectures, Faculty of Maritime Studies in Split, 2012.
Professional, scientific and artistic works published in the last five years in the subject area (maximum 5 references)	1. Lušić, Z.; Čorić, M.: Models for Estimating the Potential Number of Ship Collisions, *The Journal of Navigation* (0373-4633) 68 (2015); 735-749. 2. Čorić, M.; Gudelj, A.; Lušić, Z.: Classified Vector Quantization and its Application on Compression of Iris Images in the Safety of Marine Systems, *PROMET - Traffic &Transportation* (1848-4069), 28-2 (2016) , 125-131. 3. Lušić, Z., Kos, S., Galić, S. Standardisation of Plotting Subjects and Selecting Turning Points in Maritime Navigation, *PROMET – Traffic &Transportation*. 26 (2014), 4; 313-322 4. Lušić, Z.; Kos, S.: Ranking of sailing routes according to the potential number of groundings, *Transport* 28 (2013)-3, 295-301. 5. Lušić, Z.: Great Circle sailing-calculation of intermediate positions, *Naše more* 58 (2011), 5-6; 173-179.
Professional and scientific papers on teaching methodology and quality published in the last five years (maximum 5 references)	1. Galić, S.; Lušić, Z.; Pušić, D.: Seafarers Market, New Trends on Global Education Conference 2011, Kyrenia - North Cyprus, *International Journal of New Trends in Arts, Sports & Science Education* (IJTASE), 2012. 33-39. 2. Lušić, Z.: Novi preddiplomski studij Pomorske nautike na Pomorskom fakultetu u Splitu (New undergraduate study programme in Maritime Nautical Studies at the Faculty of Maritime Studies in Split), Kapetanov glasnik 29- 2014, HHI/PFST, Split, 2014, 22-25.
Professional, scientific and artistic projects in the subject area that were carried out in the last five years (maximum 5 references)	1. Scientific project INVESTIGATION OF THE CORRELATION OF MARITIME AND TRANSPORT ELEMENTS IN SEA TRAFFIC (ISTRAŽIVANJE KORELACIJE MARITIMNO-TRANSPORTNIH ELEMENATA U POMORSKOM PROMETU) (112-1121722-3066) – project collaborator 2. Traffic and navigation study for the Split, Ploče and Dubrovnik waterways, project manager: Ministry of Maritime Affairs, Transport and Infrastructure, contractor: Faculty of Maritime Affairs in Rijeka, leader prof. dr. sc. Damir Zec; presenters: dr. sc. Vlado Frančić, dr. sc. Igor Rudan, dipl. ing. Lovro Maglić, dr .sc. Zvonimir Lušić, dipl. ing. Ivica Đurđević-Tomaš, dipl. ing. Miloš Brajović, dipl. ing. Mate Vukić; Rijeka, 2014. 3. Maritime study for concession fields - fish farms in the Lamjana zone (G, B, VŠ1, VŠ2, VŠ3), client Cromaris d. d., contractor Faculty of Maritime Studies in Split, presenters doc. dr. sc. Zvonimir Lušić, doc. dr. sc. Zvonimir Lušić, Danijel Pušić, mag. ing. naut., izv. prof. dr. sc. Pero Vidan, izv. prof. dr. sc. Merica Slišković, Split, 2014.

	4. Maritime study for the installation of a pontoon for seaplane reception on the Obala kneza Domagoj section of the Split City Port, client: European Coastal Airlines d. o. o., facilitators: izv. prof. dr. sc. Pero Vidan, doc. dr. sc. Zvonimir Lušić, Danijel Pušić, mag. ing. naut., izv. prof. dr. sc. Merica Slišković, Ružica Popović, mag. ing., leader izv. prof. dr. sc. Pero Vidan., Split, 2015. 5. Maritime study for spatial intervention – white sea fish farm at the Zaglavić location in Lamjana Bay, client Cromaris d. d., presenters doc. dr. sc. Zvonimir Lušić, Danijel Pušić, mag. ing. naut., izv. prof. dr. sc. Pero Vidan, izv. prof. dr. sc. Merica Slišković, Ružica Popović, mag. ing., leader doc. dr. sc. Zvonimir Lušić, Split, 2015.
Within which programme and to what extent did the holder acquire methodological-psychological-didactic-pedagogical competencies?	Experience in teaching and training seafarers since 2002, within the framework of regular education and work on ships and with ship crews.
RECOGNITIONS AND AWARDS	
Recognitions and awards for teaching and scientific work/artistic work	-

Title, name and surname	**Assoc. Prof. Nikola Račić**
Subject taught in the proposed study programme	Modeling and simulation of marine propulsion systems
GENERAL INFORMATION	
Address	Slavonska 4, 21000 Split
Telephone	+385(0)913701007
E-mail address	nikola.racic@pfst.hr
Personal website	
Year of birth	1968.
Personal identification number from the Register of Scientists	188444
Scientific or artistic title and date of last election	Full-time scientific advisor, 2018.
Scientific-teaching, artistic-teaching or teaching title and date of last election	Associate professor, 20. 6. 2013.
Field and field of election to scientific or artistic title	technical sciences, mechanical engineering
DATA ON CURRENT EMPLOYMENT	
Institution of employment	University of Split, Faculty of Maritime Studies
Date of employment	1.11.1991.
Job title (professor, researcher, associate, etc.)	associate professor
Field of work	marine engineering, marine propulsion systems, marine power plants
Function	dean
EDUCATIONAL DATA – Highest degree achieved	
Title	dr. sc.
Institution	Faculty of Engineering in Rijeka
Place	Rijeka
Date	10.10.2008.
ADVANCED TRAINING	
Year	1993., 1995., 2008.
Place	Brodovi, Brodosplit – Split
Institution	Jadrolinija, Sam Shipping, Brodosplit-Split
Field of study	Trainee machine operator, tester-researcher for slow-speed MAN diesel engines
NATIVE LANGUAGES AND FOREIGN LANGUAGES	
Native language	Croatian
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	English, 5 (excellent)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	
SUBJECT COMPETENCES	
Previous experience in teaching similar subjects (state the name of the subject, the study programme in which it was/is being taught, and the level of the study programme)	Undergraduate study: Marine engines, Marine power systems, Marine steam generators and heat turbines; Graduate study: Marine energy systems; Doctoral study: Modelling and simulation of SUI engine processes

Authorship of university/college textbooks in the subject area	Račić, N., Dobrota, Đ.: Ship energy systems, Maritime Faculty in Split (*Brodski energetski sustavi*, skripta), 2012.
Professional, scientific and artistic works published in the last five years in the subject area (maximum 5 references)	1. Grljusic M., Medica V., Racic N.: *Thermodynamic Analysis of a Ship Power Plant Operating with Waste Heat Recovery through Combined Heat and Power production*, Energies, (2014) 7, pp. 7368-7394. 2. Senčić, T., Račić, N., Franković, B.: *Influence of Low-Speed Marine diesel Engine settings on Waste Heat availability,* Brodogradnja, Zagreb, 4 (2012), 329-335. 3. Grzadziela, A., Račić, N.: *Virtual Model of the Marine Propulsion System*, XV Conference ASMOR 2015, Wladyslawowo, Poland, 2015. 4. Račić, N., Radica, G., Lušić, F.: *Simulation of the Marine engine Performance with the Purpose of Predicting Parameters*, 6th Internacional Maritime Science Conference IMSC 2014, Solin, Croatia, 2014. 5. Martinić-Cezar, S., Kezić, D., Račić, N.: *Computer Control of Inteligent Ship Engine Sulzer RT-FLEX,* 32nd Conference on Transportation Systems with International Participation AUTOMATION IN TRANSPORTATION 2012, Viena, Austria, 2012., 121-125.
Professional and scientific papers on teaching methodology and quality published in the last five years (maximum 5 references)	
Professional, scientific and artistic projects in the subject area that were carried out in the last five years (maximum 5 references)	2013.- 2015. - Researcher on the CROATIAN-MONTENEGRIN project in the scientific branch of marine engineering: Possibility of reducing pollution emissions from ships in the Montenegrin and Croatian parts of the Adriatic by implementing the MARPOL Convention Anex VI.
Within which programme and to what extent did the holder acquire methodological-psychological-didactic-pedagogical competencies?	1. As a member of the council of the TEMPUS project "Modernizing and harmonizing maritime education in Montenegro and Albania" MArED, Unist-Pfst, 2013-2016. 2. Maritime management for the 21st century - sustainable and intelligent development of the coastal area through the development of occupational standards and qualification standards in the field of Maritime management and the improvement of the university graduate study of the same name: Code - H.R.3.1.15-0033, so far he has followed several educations in the organization of the project in the country and abroad. 3. Development of qualifications and innovative methods of acquiring competences in logistics and maritime transport: Code - H.R.3.1.15-0029, so far he has followed several educations in the organization of the project in the country and abroad.
RECOGNITIONS AND AWARDS	
Recognitions and awards for teaching and scientific work/artistic work	

Title, name and surname	**Asst. Prof. Maja Krčum**
Subject taught in the proposed study programme	Energy efficiency in maritime traffic
GENERAL INFORMATION	
Address	Bijankinijeva 8, Split
Telephone	0912067044
E-mail address	mkrcum@pfst.hr
Personal website	/
Year of birth	1958.
Personal identification number from the Register of Scientists	173265
Scientific or artistic title and date of last election	Scientific associate, 26.3. 2013.
Scientific-teaching, artistic-teaching or teaching title and date of last election	assistant professor, 9.4.2013.
Field and field of election to scientific or artistic title	technical sciences, field of transport and traffic technology (title-technical sciences field of electrical engineering)
DATA ON CURRENT EMPLOYMENT	
Institution of employment	University of Split, Faculty of Maritime Studies
Date of employment	1.11. 1989.
Job title (professor, researcher, associate, etc.)	assistant professor
Field of work	power systems, electrical machines, application of high-voltage technologies, quality management
Function	Director of the Quality Centre
EDUCATIONAL DATA – Highest degree achieved	
Title	doctor of science
Institution	University of Rijeka, Faculty of Maritime Studies
Place	Rijeka
Date	26.7.2012.
ADVANCED TRAINING	
Year	2006.
Place	Split
Institution	Konsberg Norcontrol
Field of study	completed the Subject for working on the marine engine room simulator Instructor Training Subject for Engine Room Simulator
NATIVE LANGUAGES AND FOREIGN LANGUAGES	
Native language	Croatian
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	English, 5 (excellent)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	Italian, 4 (very good)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	-
SUBJECT COMPETENCES	
Previous experience in teaching similar subjects (state the name of the subject, the study programme in which it was/is being taught, and the level of the study programme)	1. Ship electrical power systems, Marine engineering, Faculty of Maritime Studies in Split, undergraduate study 2. Electric motor drives, Maritime information technologies, Faculty of Maritime Studies in Split, graduate study

	4. High voltage technologies in maritime affairs, graduate study in marine engineering, Faculty of Maritime Studies in Split 5. Control of electric motor drives, University of Split, University Department of Professional Studies, Specialist Professional Study 6. Electrical Power Engineering in Maritime Affairs, University of Rijeka, Faculty of Maritime Studies, postgraduate university study
Authorship of university/college textbooks in the subject area	1. Krčum, M.: *Repetitorij s laboratorijskim vježbama iz električnih strojeva*, (Repetition with laboratory exercises in electrical machines, University of Split, Study Center for Professional Studies), Split, 2009. 2. Krčum, M: *Električni strojevi I, Električni strojevi II*, (Electrical Machines I, Electrical Machines II, University of Split, Study Center for Professional Studies), Split, 2009.
Professional, scientific and artistic works published in the last five years in the subject area (maximum 5 references)	1. Krčum, M.; Gudel, A.; Šundrica, D.: Optimization of the power management system on the ship; 35th Conference on Transportation Systems with International Participation AUTOMATION IN TRANSPORTATION 2015. 2. Krčum, M., Plazibat, V., Jelić Mrčelić, G.: Integration Sea and River Ports – the Challenge of the Croatian Transport System for the 21st Century**,** Naše more, 2015., Vol. 64 No. 4, prosinac 2015. (pregledni rad p.p. 247-255) 3. Krčum, M., Gudelj, A., Plazibat, V.: Modeling and Control of Power Management System on Ship, 34th International Conference on Organizational Science Development, March 25th – 27th 2015, Portorož, Slovenia, pp 130-139 4. Krčum, M.; Žižić, L.; Galić, S.: Energy Efficience and Sea-Ports interface // 34th Conference on Transportation Systems with International Participation, Automation in transportation, Dubrovnik 5.- 9. 2014. 5. Žižić, L.; Krčum, M.; Šakić, Z.: Sustainable Development in Shipping by Decreasing Greenhouse Gases // ICTS 2013., Maritime, Transport and Logistics Science – Conference proceedings/ Zanne, Marina;Bajec, Patricija, edidor(s), Fakulta za pomorstvo in promet Portorož, 2013., (lecture international, peer-review, published, scientific).
Professional and scientific papers on teaching methodology and quality published in the last five years (maximum 5 references)	

Professional, scientific and artistic projects in the subject area that were carried out in the last five years (maximum 5 references)	
Within which programme and to what extent did the holder acquire methodological-psychological-didactic-pedagogical competencies?	
RECOGNITIONS AND AWARDS	
Priznanja i nagrade za nastavni i Recognitions and awards for teaching and scientific work/artistic work	

Title, name and surname	**Full Prof. Danko Kezić**
Subject taught in the proposed study programme	Modelling and optimization of maritime transport systems
GENERAL INFORMATION	
Address	Velebitska 7, Split
Telephone	537165
E-mail address	danko.kezic@pfst.hr
Personal website	www.pfst.unst.hr
Year of birth	1960.
Personal identification number from the Register of Scientists	197501
Scientific or artistic title and date of last election	Full professor tenured 2016.
Scientific-teaching, artistic-teaching or teaching title and date of last election	-
Field and field of election to scientific or artistic title	Scientific advisor in the field of technical sciences, field of electrical engineering, branch of electronics. Scientific associate in the field of technical sciences, field of technology, traffic and transport, branch of maritime and river traffic.
DATA ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Maritime Studies, University of Split
Date of employment	8.6.1996.
Job title (professor, researcher, associate, etc.)	full professor
Field of work	automation
Function	Head of the Institute for Maritime Electrotechnical and IT Technologies
EDUCATIONAL DATA – Highest degree achieved	
Title	doctor of science
Institution	Faculty of Electrical Engineering and Computing
Place	Zagreb
Date	4. 12. 2003.
ADVANCED TRAINING	
Year	
Place	
Institution	
Field of study	
NATIVE LANGUAGES AND FOREIGN LANGUAGES	
Native language	Croatian
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	English, 4 (very good)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	Italian, 3 (good)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	
SUBJECT COMPETENCES	

Previous experience in teaching similar subjects (state the name of the subject, the study programme in which it was/is being taught, and the level of the study programme)	1. Electronic security systems in maritime affairs, undergraduate study in Maritime electrical engineering and information technology, Faculty of Maritime Studies in Split 2. Computer control of technical systems, undergraduate study in Maritime electrical engineering and information technology, Faculty of Maritime Studies in Split 3. Synthesis of control production and traffic systems, graduate study in Maritime electronic and information technology, Faculty of Maritime Studies in Split 3. Control of robotic production systems, Doctoral study in Maritime Studies, Faculty of Maritime Studies in Rijeka 4. Control of flexible production systems, Doctoral study in Electrical Engineering, FESB Split
Authorship of university/college textbooks in the subject area	-
Professional, scientific and artistic works published in the last five years in the subject area (maximum 5 references)	1. Peša, T., Kezić, D.: Computer network of ship integrated navigation system, Proc. of 31th Conference on Transportation Systems with International Participation Automation in transportation 2011, Pula – Milano, pp 98-102. 2. Kezić, D., Bogdan, S.,Kasum, J.: Design of Deadlock Prevention Supervisor in Waterway with Multiple Locks and Canals, Transactions on Maritime science, Vol 1, No 1/2012, pp. 22-34. 3. Gudelj, A., Kezić, D.,Vidačić, S.: Planning and Optimization of AGV Jobs by Petri Net and Genetic Algorithm, Journal of Information and Organizational Sciences, Vol. 36. No.2(2012), pp. 99-122. Original scientific paper 4. Gudelj A., Kezić D, Vidačić S.: Marine Traffic Optimization Using Petri Net and Genetic Algorithm, Promet, Vol 24, No. 6/2012, pp. 469-478. – Original scientific paper. 5. Vidan P., Kezić, D, Gudelj, A.: Menagement of Lock Navigation to Reduce Queuing, Brodogradnja, Vol 64, No. 2/2013, pp.1-18. – Preliminary communication.
Professional and scientific papers on teaching methodology and quality published in the last five years	
Professional, scientific and artistic projects in the subject area that were carried out in the last five years (maximum 5 references)	
Within which programme and to what extent did the holder acquire methodological-psychological-didactic-	
RECOGNITIONS AND AWARDS	
Recognitions and awards for teaching and scientific	

Title, name and surname	**Assoc. Prof. Ivan Komar**
Subject taught in the proposed study programme	Technical supervision of maritime vessels
GENERAL INFORMATION	
Address	Vjekoslava Paraća 5, 21 000 Split
Telephone	+385 91 380 7011
E-mail address	ivan.komar@pfst.hr
Personal website	http://www.pfst.unist.hr
Year of birth	1953.
Personal identification number from the Register of Scientists	291705
Scientific or artistic title and date of last election	senior scientific associate, 2013.
Scientific-teaching, artistic-teaching or teaching title and date of last election	associate professor, 31.10.2017.
Field and field of election to scientific or artistic title	technical field, traffic and transport technology
DATA ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Maritime Studies, University of Split
Date of employment	1. 10. 2006.
Job title (professor, researcher, associate, etc.)	assistant professor
Field of work	technical area
Function	Vice Dean for Management
EDUCATIONAL DATA – Highest degree achieved	
Title	Doctor of Science
Institution	Faculty of Maritime Studies, University of Rijeka
Place	Rijeka
Date	11. 1. 2012.
ADVANCED EDUCATION	
Year	
Place	
Institution	
Field of study	
NATIVE LANGUAGES AND FOREIGN LANGUAGES	
Native language	Croatian
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	English, 5 (excellent)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	German, 2 (sufficient)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	Russian, 2 (sufficient)
SUBJECT COMPETENCES	
Previous experience in teaching similar subjects (state the name of the subject, the study programme in which it was/is being taught, and the level of the study programme)	Doctoral study in Maritime Studies (PFRI): Technical supervision of maritime vessels Graduate study in Marine Engineering: Maintenance systems Graduate study in Marine Electrical Engineering Technologies: Reliability and maintenance of ship mechanical systems Undergraduate study in Marine Engineering: Technical supervision and classification

Authorship of university/college textbooks in the subject area	
Professional, scientific and artistic works published in the last five years in the subject area (maximum 5 references)	1. Mihanović, L, Komar, I, Grzan, M. Methodology Analysis Using Exploitation Reliability with the use of the RTOP Main Diesel Engine, *Naše more*, Volume 63-Issue2-Str.48-55, Dubrovnik,2016. 2. Komar, I. , Vulić, N. , Roldo, L. Hydrodynamic and elastohydrodynamic lubrication models to verify performance of marine propulsion shafting, *Transactions of FAMENA*, 37(2013)1, str. 15-27. 3. Roldo, L., Komar, I., Vulić, N. Design and Materials Selection for Environmentally Friendly Ship Propulsion System, *Strojniški vestnik - Journal of Mechanical Engineering*, 59(2013)1, str. 25-31. 4. Roldo, L., Komar, I., Vulić, N., *Environmental friendly ship propulsion system: case of aft stern tube bearing*, International Conference on Offshore and Marine Technology: Science and Innovation, Rio Grande, Brazil, 2012. 5. Roldo, L., Komar, I., Vulić, N., *Materials selection and software application as design tools for marine propulsion shafting bearings*, International Design Conference - DESIGN 2012, Cavtat, 2012.
Professional and scientific papers on teaching methodology and quality published in the last five years (maximum 5 references)	
Professional, scientific and artistic projects in the subject area that were carried out in the last five years (maximum 5 references)	1. Leader of the international scientific research project "Possibilities for reducing pollutant emissions from ships in the Montenegrin and Croatian parts of the Adriatic by implementing Annex VI of the MARPOL Convention", which is co-financed by the Ministry of Education, Science and Technology of the Republic of Croatia within the framework of joint Croatian-Montenegrin cooperation for 2013/14. and - 2. Leader of project no. 250-2502209-2364, financed by the Ministry of Education, Science and Technology of the Republic of Croatia under the title New technologies in diagnostics and management of ship propulsion systems. 3. Collaborator on project no. 250-2502209-2366: Management of ship energy systems in conditions of failure and breakdown.
Within which programme and to what extent did the holder acquire methodological-psychological-didactic-pedagogical	
RECOGNITIONS AND AWARDS	
Recognitions and awards for teaching and scientific work/artistic work	-

Title, name and surname	**Assoc. prof. Tatjana Stanivuk**
Subject taught in the proposed study programme	
GENERAL INFORMATION	
Address	Ruđera Boškovića 37, 21000 Split
Telephone	+385(0)913807013
E-mail address	tstanivu@pfst.hr
Personal website	
Year of birth	1970.
Personal identification number from the Register of Scientists	324390
Scientific or artistic title and date of last election	scientific associate, 19. 2. 2014.
Scientific-teaching, artistic-teaching or teaching title and date of last election	associate professor, 30.12.2017.
Field and field of election to scientific or artistic title	field of technical sciences, field of traffic and transport technologies
DATA ON CURRENT EMPLOYMENT	
Institution of employment	University of Split, Faculty of Maritime Studies
Date of employment	1. 9. 2007.
Job title (professor, researcher, associate, etc.)	assistant professor
Field of work	scientific research, teaching
Function	subject teacher
EDUCATIONAL DATA – Highest degree achieved	
Title	Doctor of Science
Institution	University of Split, Faculty of Economics
Place	Split
Date	8. 6. 2012.
ADVANCED EDUCATION	
Year	
Place	
Institution	
Field of study	
NATIVE LANGUAGES AND FOREIGN LANGUAGES	
Native language	Croatian
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	English, 3 (good)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	French 2 (sufficient)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	
SUBJECT COMPETENCES	
Previous experience in teaching similar subjects (state the name of the subject, the study programme in which it was/is being taught, and the level of the study programme)	Applied Mathematics in Navigation, Mathematics 1, Mathematics 2 and Mathematics 3 in undergraduate studies at the Faculty of Maritime Studies in Split; Mathematics 4 and Applied Mathematics in graduate studies at the Faculty of Maritime Studies in Split; Mathematics in undergraduate studies at the Department of Marine Studies at the University of Split; Introduction of new teaching content within the above subjects as well as new subjects (e.g. Applied Mathematics in Navigation and Applied Mathematics).

Authorship of university/college textbooks in the subject area	Tomašević, M., Ristov, P., Stanivuk T.: *Metodologija znanstvenog istraživačkog rada - statističke metode u istraživanju.* Sveučilišni udžbenik, Pomorski fakultet Sveučilišta u Splitu, (Methodology of scientific research work - statistical methods in research. University textbook, Faculty of Maritime Studies, University of Split) Split, 2007, ISBN: 978-953-6655-46-5.
Professional, scientific and artistic works published in the last five years in the subject area (maximum 5 references)	1. Stanivuk, T.; Medić, B.; Medić, M.: Statistical Review of the Annual Report on the Performance of Maritime Safety Inspection in Croatia. *Transactions on Maritime Science*. 4 (2015), 1; 41-51. 2. Domazet, Ž.; Lukša, F.; Stanivuk, T.: The influence of rolling speed on the fatigue life of rolls with grooves. *International journal of damage mechanics*. 23 (2014), 4; 523-536. 3. Kasum, J.; Cvjetković, S., J.; Stanivuk, T.: Dynamic Model for Calculating the VHF Radio Horizon at Sea. *Brodogradnja: časopis brodogradnje i brodograđevne industrije*. 64 (2013), 4; 482-487. 4. Stanivuk, T.; Tokić, T.: Impact of weather conditions on the construction of the terminal - Monte Carlo simulation. *International journal for Traffic and Transport Engineering*. 3 (2013), 1; 34-44. 5. Stanivuk, T.; Tokić, T.: Alternative Shipping Routes and Simulations of LNG Storage at Export / Import Terminals. *Naše more : znanstveni časopis za more i pomorstvo.* 60 (2013), 3-4; 61-67.
Professional and scientific papers on teaching methodology and quality published in the last five years	
Professional, scientific and artistic projects in the subject area that were carried out in the last five years (maximum 5 references)	The scientific research project No. 250-2502209-2364 and the international research Project “The possibilities of reducing pollutant emissions from ships in the Montenegrin and Croatian Adriatic implementing Anex VI of MARPOL Convention" supported by the Ministry of Science, Education and Sport of the Republic of Croatia.
Within which programme and to what extent did the holder acquire methodological-psychological-didactic-pedagogical competencies?	During the studies - completed the teaching programme. By participating in the work of regional and county expert councils of mathematics teachers - 10 certificates of professional development; by passing the professional exam - a certificate for work in mathematics teaching from the Ministry of Education and Sports of the Republic of Croatia and permanent individual professional development in the pedagogical-psychological and didactic-methodical areas. The holder of teaching activities lasting several thousand hours from 2001 to the present.
RECOGNITIONS AND AWARDS	
Recognitions and awards for teaching and scientific work/artistic work	Recognition - In 2011, nominated by students and also selected as one of the thirteen Best Professors at the University of Split.

Title, name and surname	**Assoc. prof. Anita Gudelj**
Subject taught in the proposed study programme	Modelling and optimization of maritime transport systems
GENERAL INFORMATION	
Address	Velebitska 58
Telephone	0913807023
E-mail address	anita@pfst.hr
Personal website	www.pfst.hr
Year of birth	1970.
Personal identification number from the Register of Scientists	278411
Scientific or artistic title and date of last election	senior scientific associate, 18. 6. 2013.
Scientific-teaching, artistic-teaching or teaching title and date of last election	Associate Professor, 14.12.2016.
Field and field of election to scientific or artistic title	social sciences, field of information and communication sciences, branch of information systems and informatics
DATA ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Maritime Studies, University of Split
Date of employment	1. 3. 1997.
Job title (professor, researcher, associate, etc.)	assistant professor
Field of work	information systems
Function	Head of the Department for General and Common
EDUCATIONAL DATA – Highest degree achieved	
Title	Doctor of Science
Institution	University of Zagreb, Faculty of Organization and Informatics
Place	Varaždin
Date	2. 12. 2010.
ADVANCED EDUCATION	
Year	
Place	
Institution	
Field of study	
NATIVE LANGUAGES AND FOREIGN LANGUAGES	
Native language	Croatian
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	English, 4 (very good)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	
SUBJECT COMPETENCES	
Previous experience in teaching similar subjects (state the name of the subject, the study programme in which it was/is being taught, and the level of the	
Authorship of university/college textbooks in the subject area	

Professional, scientific and artistic works published in the last five years in the subject area (maximum 5 references)	1. Gudelj, A., Kezić, D.,Vidačić, S.*:* Planning and Optimization of AGV Jobs by Petri Net and Genetic Algorithm, *Journal of Information and Organizational Sciences,* Vol. 36. No.2(2012), pp. 99-122. Original scientific paper 2. Gudelj, A., Kezić, D, Vidačić, S.: Marine Traffic Optimization Using Petri Net and Genetic Algorithm, *Promet*, Vol 24, No. 6/2012, pp. 469-478. – Original scientific paper. 3. Vidan, P., Kezić, D, Gudelj, A.: Menagement of Lock Navigation to Reduce Queuing, *Brodogradnja*, Vol 64, No. 2/2013, pp.1-18. – Preliminary communication. 4. Gudelj, A., Kezić, D,: Optimization of Waterway with Multiple Locks and Canals by Integration of Petri Net and Genetic Algorithm, *Journal of Mathematics and System Science,* Vol. 3, No. 12, 2013, pp. 577-591 5. Negotić, M., Gudelj, A., Kezić, D.: *Automated guided vehicle traffic control at a container terminal using coloured Petri net,* Proc. of 34th Conference on Transportation Systems with International Participation Automation in transportation 2014, Dubrovnik, 5-9.11.2014. pp 120-123.
Professional and scientific papers on teaching methodology and quality published in the last five years	
Professional, scientific and artistic projects in the subject area that were carried out in the last five years (maximum 5 references)	
Within which programme and to what extent did the holder acquire methodological-psychological-didactic-	
RECOGNITIONS AND AWARDS	
Recognitions and awards for teaching and scientific work/artistic work	

Title, name and surname	**Asst. Prof. Zdeslav Jurić**
Subject taught in the proposed study programme	Energy efficiency of marine systems
GENERAL INFORMATION	
Address	Ruđera Boškovića 37
Telephone	021/619-399
E-mail address	zdeslav@pfst.hr
Personal website	
Year of birth	1974.
Personal identification number from the	276782
Scientific or artistic title and date of last election	
Scientific-teaching, artistic-teaching or teaching title and date of last election	assistant professor, 1. 7. 2011.
Field and field of election to scientific or artistic title	field of technical sciences, field of mechanical engineering, branch of process energy engineering
DATA ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Maritime Studies in Split
Date of employment	1. 4. 2001.
Job title (professor, researcher, associate, etc.)	assistant professor
Field of work	
Function	Head of the Department of Marine Engineering
EDUCATIONAL DATA – Highest degree achieved	
Title	Doctor of Science
Institution	University of Split, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Place	Split
Date	23. 2. 2010.
ADVANCED EDUCATION	
Year	2016.
Place	Gdynia, Poland
Institution	Akademia marynarki Wojennej
Field of study	Marine engineering group of subjects: thermodynamics, working on a marine engineering simulator
NATIVE LANGUAGES AND FOREIGN LANGUAGES	
Native language	Croatian
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	English, 4 (very good)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	
SUBJECT COMPETENCES	
Previous experience in teaching similar subjects (state the name of the subject, the study programme in which it was/is being taught, and the level of the study programme)	Undergraduate University Study of Naval Engineering: - Thermodynamics and Heat Transfer - Marine Refrigeration and Air Conditioning Devices Graduate University Study of Naval Engineering: - Heat and Mass Transfer

Authorship of university/college textbooks in the subject area	
Professional, scientific and artistic works published in the last five years in the subject area (maximum 5 references)	Jurić, Z., Račić, N., Dobrota, Đ.: *Thermodynamic analysis of onboard compressed air supplied system*, 17th International Conference on Transport Science - ICTS 2015, 21. – 22. svibnja 2015., str. 131. – 138.
Professional and scientific papers on teaching methodology and quality published in the last five years (maximum 5 references)	
Within which programme and to what extent did the holder acquire methodological-psychological-didactic-pedagogical	
RECOGNITIONS AND AWARDS	
Recognitions and awards for teaching and scientific	

Title, name and surname	**Asst. Prof. Joško Šoda**
Subject taught in the proposed study programme	Advanced algorithms in traffic control systems
GENERAL INFORMATION	
Address	Ruđera Boškovića 33
Telephone	+385 91 380-7-084
E-mail address	jsoda@pfst.hr
Personal website	/
Year of birth	1974.
Personal identification number from	248935
Scientific or artistic title and date of last election	research associate, March 2014.
Scientific-teaching, artistic-teaching or teaching title and date of last election	assistant professor, May 2015.
Field and field of election to scientific or artistic title	technical sciences, electrical engineering, electronics
DATA ON CURRENT EMPLOYMENT	
Institution of employment	Maritime Faculty in Split
Date of employment	1.12. 2012.
Job title (professor, researcher, associate, etc.)	professor
Field of work	maritime systems and signal processing and signal processing in brain research
Function	editor of the scientific journal ToMS, head of the laboratory for ship process control and co-head of the laboratory for signal processing and analysis (SPAADREL)
EDUCATIONAL DATA – Highest degree achieved	
Title	Doctor of Science
Institution	FESB
Place	Split
Date	June 2010.
ADVANCED EDUCATION	
Year	
Place	
Institution	
Field of study	
NATIVE LANGUAGES AND FOREIGN LANGUAGES	
Native language	Croatian
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	English, 5 (excellent)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	
SUBJECT COMPETENCES	
Previous experience in teaching similar subjects (state the name of the subject, the study programme in which it was/is being taught, and the level of the study programme)	Digital Instrumentation II (FESB, graduate) Advanced topics in signal processing (Faculty of Maritime Studies, graduate MEIT) Selected topics in time-frequency signal analysis (PhD at FESB)
Authorship of university/college textbooks in the subject area	*Digital Instrumentation II (script)* *Digital Instrumentation II (laboratory exercises)* Lecture notes

Professional, scientific and artistic works published in the last five years in the subject area (maximum 5 references)	1. Rogić Vidaković, M.; Gabelica, D.; Vujović, I.; Šoda, J.; Batarelo, N.; Džimbeg, A.; Zmajević Schönwald, M.; Rotim, K.; Đogaš, Z.; A novel approach for monitoring writing interferences during navigated transcranial magnetic stimulation mappings of writing related cortical areas. // *Journal of Neuroscience Methods*. **255** (2015) ; 139-150 (članak, znanstveni) 2. Šoda, J.; Vujović, I.; Kulenović, Z.; Analysis of the Vibration Signal Using Time- Frequency Methods. // *Transactions of FAMENA*. **39** (2015), 3; 23-34 (članak, znanstveni). 3. Čić, M.; Šoda, J.; Bonković, M.; Automatic classification of infant sleep based on instantaneous frequencies in a single-channel EEG signal. // *Computers in biology and medicine*. **43** (2013), 12; 2110-2117 (članak, znanstveni). 4. Šoda, J.; Beroš, S. M.; Kuzmanić, I.; Vujović, I.; Discontinuity Detection in the Vibration Signal of Turning Machines // *Experimental and Numerical Investigation of Advanced Materials and Structures Advanced Structured Materials* / Öchnser, Andreas; Altenbach, Holm (ur.). London: Springer International Publishing Switzerland, 2013. Str. 27-54. 5. Vujović, I.; Šoda, J.; Kuzmanić, I. Stabilising illumination variations in motion detection for surveillance applications. // *IET image processing*. **7** (2013), 7; 671-678 (članak, znanstveni).
Professional and scientific papers on teaching methodology and quality published in the last five years (maximum 5 references)	
Professional, scientific and artistic projects in the subject area that were carried out in the last five years (maximum 5 references)	
Within which programme and to what extent did the holder acquire methodological-psychological-didactic-pedagogical competencies?	
RECOGNITIONS AND AWARDS	
Recognitions and awards for teaching and scientific work/artistic work	M. R. Vidaković, D. Gabelica, J. Šoda, I. Vujović, M. Z. Schönwald, K. Rotim, Z. Đogaš, A Novel Approach for Monitoring Writing During Navigated Transcranial Magnetic Stimulation Mappings of Writing Related Cortical Areas, 7th International Symposium on Navigated Brain Stimulation in Neurosurgery, 11-12.10. 2015. *Winner – Best Poster Award 2015*.

Title, name and surname	**Assoc. Prof. Igor Vujović**
Subject taught in the proposed study programme	Advanced algorithms in traffic control systems
GENERAL INFORMATION	
Address	Ruđera Boškovića 37
Telephone	0913807016
E-mail address	ivujovic@pfst.hr
Personal website	www.pfst.hr/~ivujovic
Year of birth	1972.
Personal identification number from the Register of Scientists	260951
Scientific or artistic title and date of last election	Senior Research Associate, Electrical Engineering, 2018 Research Associate, Traffic and Transport Technology 17. 2. 2016
Scientific-teaching, artistic-teaching or teaching title and date of last election	Associate Professor, Electrical Engineering, 2.5.2018.
Field and field of election to scientific or artistic title	- technical sciences, electrical engineering - technical sciences, traffic and transport technology
DATA ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Maritime Studies in Split
Date of employment	2001.
Job title (professor, researcher, associate, etc.)	assistant professor
Field of work	signal processing and analysis, video, image, biomedical, vibration signals, electrotechnical materials and technologies
Function	executive editor of the scientific journal ToMS, head of the Laboratory for Signal Processing and Analysis (SPAADREL)
EDUCATIONAL DATA – Highest degree achieved	
Title	Doctor of Science
Institution	FESB
Place	Split
Date	19. 10. 2011.
ADVANCED EDUCATION	
Year	
Place	
Institution	
Field of study	
NATIVE LANGUAGES AND FOREIGN LANGUAGES	
Native language	Croatian
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	English, 4 (very good)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	German, 2 (sufficient)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	
SUBJECT COMPETENCES	
Previous experience in teaching similar subjects (state the name of the subject, the study programme in which it was/is being taught, and the level of the	Signal Processing and Analysis (undergraduate study in Marine Electrical and Information Technology). New Technologies in Diagnostics and Control (graduate study in Marine Electrical and Information Technology, graduate study in Naval Architecture).

	Computer Control of Technical Systems Selected Chapters in Time-Frequency Signal Analysis (PhD study at FESB)
Authorship of university/college textbooks in the subject area	Teaching materials on websites.
Professional, scientific and artistic works published in the last five years in the subject area (maximum 5 references)	1. Rogić Vidaković, M., Gabelica, D., Vujović, I., Šoda, J., Batarelo, N., Džimbeg, A., Zmajević Schönwald, M., Rotim, K., Đogaš, Z. A novel approach for monitoring writing interferences during navigated transcranial magnetic stimulation mappings of writing related cortical areas, *Journal of Neuroscience Methods*. 255 (2015), 139-150 (CC, SCI članak u časopisu). 2. Vujović, I., Kulenović, Z., Kuzmanić, I. New Algorithm for Optimal Dielectric Material Selection in Marine Environment, *Brodogradnja*, 66(2015), 3, pp. 39-48 (SCI članak u časopisu) 3. Šoda, J., Vujović, I., Kulenović, Z. Analysis of the Vibration Signal Using Time-Frequency Methods, *Transactions of FAMENA*, 39(2015), 3, pp.23-34. (SCI članak u časopisu) 4. Vujović, I. *Multiresolution Approach to Processing Images for Different Applications-Interaction of Lower Processing with Higher Vision*, SpringerBriefs in Electrical and Computer Engineering, Springer Cham Heidelberg New York Dordrecht London, Springer Verlag, 2015. (znanstvena monografija) 5. Vujović, I. Šoda, J., Kuzamanić, I. Stabilising illumination variations in motion detection for surveillance applications, *IET Image Processing*, 7(2013), 7, pp. 671-678, 2013. (CC, SCI članak u časopisu) Other works visible in CROSBI.
Professional and scientific papers on teaching methodology and quality published in the last five years (maximum 5 references)	1. Vujović, I., Kuzmanić, I., Kulenović, Z. *Dielectric Materials' Selection for Marine Applications*, LAP LAMBERT Academic Publishing, Saarbrücken, Germany, 2014. 1. Kuzmanić, I., Vujović, I. Observation of Damage to Materials for Educational Purposes at the BSc Level, u knjizi: *Design and Analysis of Materials and Engineering Structures*, serija knjiga Advanced Structured Materials, pp. 27-35, Springer-Verlag, New York, 2013.
	/
Within which programme and to what extent did the holder acquire methodological-psychological-didactic-pedagogical	/
RECOGNITIONS AND AWARDS	
Recognitions and awards for teaching and scientific work/artistic work	M.R. Vidaković, D. Gabelica, J. Šoda, I. Vujović, M. Z. Schönwald, K. Rotim, Z. Đogaš, A Novel Approach for Monitoring Writing During Navigated Transcranial Magnetic Stimulation Mappings of Writing Related Cortical Areas, 7th International Symposium on Navigated Brain Stimulation in Neurosurgery, 11-12.10. 2015. *Winner – Best Poster Award 2015.*

Title, name and surname	**Asst. Prof. Petar Matić**
Subject taught in the proposed study programme	Advanced algorithms in traffic control systems
GENERAL INFORMATION	
Address	Kukuljevićeva 17, Split
Telephone	098 735 196
E-mail address	pmatic@pfst.hr
Personal website	
Year of birth	1981.
Personal identification number from the	291716
Scientific or artistic title and date of last election	scientific associate, 19.4.2017.
Scientific-teaching, artistic-teaching or teaching title and date of last election	assistant professor, 10.10.2017.
Field and field of election to scientific or artistic title	scientific associate in the field of technical sciences, electrical engineering, automation and robotics
DATA ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Maritime Studies, University of Split
Date of employment	2.1.2007.
Job title (professor, researcher, associate, etc.)	assistant professor
Field of work	automation
Function	
EDUCATIONAL DATA – Highest degree achieved	
Title	Doctor of Science
Institution	University of Split, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture - FESB
Place	Split, Croatia
Date	12. 12. 2014.
ADVANCED EDUCATION	
Year	
Place	
Institution	
Field of study	
NATIVE LANGUAGES AND FOREIGN LANGUAGES	
Native language	Croatian
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	English, 5 (excellent)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5	
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	
SUBJECT COMPETENCES	
Previous experience in teaching similar subjects (state the name of the subject, the study programme in which it was/is being taught, and the level of the study programme)	1. Modelling and simulation in electrical engineering, graduate study of Maritime Electrical and Information Technology - MEIT, Maritime Faculty in Split

Authorship of university/college textbooks in the subject area	
Professional, scientific and artistic works published in the last five years in the subject area (maximum 5 references)	1. Matić, P. *Kratkoročno predviđanje hidrološkog dotoka pomoću umjetne neuronske mreže*, doktorski rad, FESB Split, 2014. 2. Šarolić, A.; Matić, P. Wireless LAN Electromagnetic Field Prediction for Indoor Environment Using Artificial Neural Network Automatika – *Journal for Control, Measurement, Electronics, Computing and Communications* Vol. 51, No. 3, pp. 2010. 3. Matić, P.; Bego, O.; Goić, R. A Systematic Approach to a Time Series Neural Model Development for River Flow Forecasting *International Review of Automatic Control* (IREACO) Vol. 5. No. 3, 2012. 4. Mudronja, L., Matić, P., & Katalinić, M. Data-based modelling of significant wave height in the Adriatic Sea. *Transactions on maritime science*, 6(01), 5-13, 2017.
Professional and scientific papers on teaching methodology and quality published in the last five years (maximum 5 references)	
Professional, scientific and artistic projects in the subject area that were carried out in the last five years (maximum 5	
Within which programme and to what extent did the holder acquire methodological-psychological-didactic-pedagogical	
RECOGNITIONS AND AWARDS	
Recognitions and awards for teaching and scientific work/artistic work	

Title, name and surname	**Assoc. Prof. Merica Slišković**
Subject taught in the proposed study programme	Sustainable maritime transport system from the aspect of ecology and environmental protection
GENERAL INFORMATION	
Address	Cesta mira 18b, Split
Telephone	0913806997
E-mail address	merica.sliskovic@pfst.hr
Personal website	
Year of birth	1973.
Personal identification number from the Register of Scientists	252443
Scientific or artistic title and date of last election	
Scientific-teaching, artistic-teaching or teaching title and date of last election	associate professor, 29. 1. 2014.
Field and field of election to scientific or artistic title	Senior scientific associate in the field of biotechnical sciences, field of agriculture, branch of ecology and environmental protection
DATA ON CURRENT EMPLOYMENT	
Institution of employment	University of Split, Faculty of Maritime Studies
Date of employment	1. 11. 1998.
Job title (professor, researcher, associate, etc.)	associate professor
Field of work	ecology and environmental protection
Function	vice dean for education
EDUCATIONAL DATA – Highest degree achieved	
Title	Doctor of Science
Institution	University of Zagreb, Faculty of Agriculture
Place	Zagreb
Date	23. 2. 2007.
ADVANCED EDUCATION	
Year	1. 2016. 2. 2005., 2012. 3. 2007.
Place	
Institution	1. Lloyds Maritime Academy, London 2. Universitat Politecnica de Catalunya (UPC) – online 3. CARNet
Field of study	1. Marine Pollution Prevention and Management Subject 2. Modeling of ecological systems and Management of renewable resources; Advanced Subject in System Dynamics 3. E-learning Tutoring Academy (SRCE)
NATIVE LANGUAGES AND FOREIGN LANGUAGES	
Native language	Croatian
Foreign language and language proficiency on a scale from 2 (sufficient) to 5	English, 5 (excellent)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5	Italian, 3 (good)

Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	
SUBJECT COMPETENCES	
Previous experience in teaching similar subjects (state the name of the subject, the study programme in which it was/is being taught, and the level of the study programme)	Marine Ecology, Maritime Management, Undergraduate Studies Protection of the Sea and Marine Environment, Maritime Management, Undergraduate Studies
Authorship of university/college textbooks in the subject area	*Ekologija mora*, digitalni priručnik (Marine Ecology, Digital Handbook)
Professional, scientific and artistic works published in the last five years in the subject area (maximum 5 references)	1. Ukić, H.; Zubanović, V.; Bečić, M.; Slišković, M.; Jelić Mrčelić, G. 2014. Upravljanje u ribarstvu korištenjem sustava individualno prenosivih kvota, prilozi ribarstvenoj praksi (Fisheries management using the individually transferable quota system, contributions to fisheries practice), Croatian Journal of Fisheries, Ribarstvo, 72 http://dx.doi.org/10.14798/72.1.726, 45-47. 2. Šeparović, M.; Jelić Mrčelić, G.; Slišković, M. 2014. The implementation of the Convention on Biological Diversity, Book of Proceedings The 6th International Marine Science Conference, Solin, Croatia, 28.-29. 04., ISSN 1847-1498, 201-204. 3. Jurić, M.; Jelić Mrčelić, G.; Slišković, M. 2013. Balast waters and the Environment,, Book of Proceedings The 5th International Marine Science Conference, Solin, Croatia, 22.-23. 04., ISSN 1847-1498, 39-42. 4. Borčić, L.; Jelić Mrčelić, G.; Slišković, M. 2013. Ecological Aspects of Nautical Tourism, Book of Proceedings The 5th International Marine Science Conference, Solin, Croatia, 22.-23. 04., ISSN 1847-1498, 109-112. 5. Jelić Mrčelić, G.; Slišković, M. 2012, Book of Proceedings of XXXII. International Conference on Agricultural, Biotechnology, Biosystems, Biological Engineering ICABBBE, Firenca, Italija, 28.-29. veljača 2012. Organizator: World Academy of Science, Engineering and Technology WASET, ISSN 2010-
Professional and scientific papers on teaching methodology and quality published in the last five	
Professional, scientific and artistic projects in the subject area that were carried out in the last five years (maximum 5	
Within which programme and to what extent did the holder acquire methodological-psychological-didactic-pedagogical	*CARNet E-learning Tutoring Academy* (SRCE)
RECOGNITIONS AND AWARDS	
Recognitions and awards for teaching and scientific	

Title, name and surname	**Assoc. Prof. Gorana Jelić Mrčelić**
Subject taught in the proposed study programme	Sustainable maritime transport system from the aspect of ecology and environmental protection
GENERAL INFORMATION	
Address	Vukovarska 57, Split
Telephone	091 380 6998
E-mail address	gjelic@pfst.hr
Personal website	-
Year of birth	1973.
Personal identification number from the	1252566
Scientific or artistic title and date of last election	
Scientific-teaching, artistic-teaching or teaching title and date of last election	associate professor, 29. 1. 2014.
Field and field of election to scientific or artistic title	Senior Scientific Associate in the field of biotechnical sciences, field of agriculture, branch of ecology and environmental protection
DATA ON CURRENT EMPLOYMENTc	
Institution of employment	Faculty of Maritime Studies, University of Split
Date of employment	1.6.1996.
Job title (professor, researcher, associate, etc.)	associate professor
Field of work	environmental protection
Function	Vice Dean for Development and International Cooperation
EDUCATIONAL DATA – Highest degree achieved	
Title	Doctor of Science
Institution	Faculty of Agriculture Zagreb
Place	Zagreb
Date	26. 11. 2004.
ADVANCED EDUCATION	
Year	
Place	
Institution	
Field of study	
NATIVE LANGUAGES AND FOREIGN LANGUAGES	
Native language	Croatian
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	English, 5 (excellent)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	Italian, 3 (good)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	French, 2 (sufficient)
SUBJECT COMPETENCES	
Previous experience in teaching similar subjects (state the name of the subject, the study programme in which it was/is being taught, and the level of the	Lecturer of the Subject Ballast Water Management and Environmental Impact Planning at the doctoral study programme Maritime Studies at the Faculty of Maritime Studies in Rijeka

Authorship of university/college textbooks in the subject area	-
Professional, scientific and artistic works published in the last five years in the subject area (maximum 5 references)	1. Jelić Mrčelić, G.; Slišković, M. 2013. *Sustainable Ship Management*. Book of Proceedings World Academy of science, Engineering and Technology, international Conference on Biological, Ecological and Environmental Sciences and Engineering. 555-558. 2. Jurić, M.; Jelić Mrčelić, G.; Slišković, M. 2013. *Balast waters and the Environment*. Book of Proceedings The 5th International Marine Science Conference. 39-42. 3. Jelić Mrčelić, G.; Slišković, M.; Stipica, F. 2011. *Brod kao izvor onečišćenja mora*. Zbornik radova Ekologija i saobraćaj II. savjetovanje s međunarodnim učešćem (The ship as a source of sea pollution. Proceedings Ecology and Traffic II. consultation with international participation), Travnik, BIH, 2.-3. lipanj 2011. Organizer: International University Travnik, ISSN 2232-8807,300-306. 4. Jelić Mrčelić, G.; Slišković, M.; Bajamić, M. 2011. *The protection of marine environment in the Republic of Croatia*. Book of Abstracts 3th International Maritime Science Conference IMSC, Split, 21. svibanj 2011. Organizator: Pomorski fakultet Split, Hrvatski hidrografski institut, ISSN 1847-1498, 15. 5. Jelić Mrčelić, G.; Slišković, M.; Vidović, J. 2011. *Pravni propisi i metode prevencije onečišćenja okoliša s brodova (Legal regulations and methods for preventing environmental pollution from ships)*. Book of Abstracts 3th International Maritime Science Conference IMSC, Split, 21. svibnja 2011. Organizator: Pomorski fakultet Split, Hrvatski hidrografski institut, ISSN 1847-1498, 17.
Professional and scientific papers on teaching methodology and quality published in the last five years (maximum 5 references)	
Professional, scientific and artistic projects in the subject area that were carried out in the last five years (maximum 5	
Within which programme and to what extent did the holder acquire methodological-psychological-didactic-pedagogical	E-learning Academy SRCE
RECOGNITIONS AND AWARDS	
Recognitions and awards for teaching and scientific work/artistic work	

Title, name and surname	**Full Prof. Josip Kasum**
Subject taught in the proposed study programme	Forensic hydrography, modelling and simulation
GENERAL INFORMATION	
Address	Osječka 52., 21000 Split
Telephone	+385 91 215 7064
E-mail address	josip.kasum@pfst.hr josip.kasum@unist.hr
Personal website	www.forenzika.unist.hr www.pfst.unist.hr
Year of birth	1961.
Personal identification number from the	222324
Scientific or artistic title and date of last election	full professor tenured, 24. 5. 2016.
Scientific-teaching, artistic-teaching or teaching title and date of last election	
Field and field of election to scientific or artistic title	scientific advisor in the field of technical sciences, field of technology, traffic and transport, branch of maritime and river transport
DATA ON CURRENT EMPLOYMENT	
Institution of employment	University Department of Forensic Sciences, University of Split
Date of employment	1. 2. 2015.
Job title (professor, researcher, associate, etc.)	full professor with permanent position
Field of work	maritime forensics, hydrography, maritime and underwater security, corporate security
Function	Deputy Head of the Forensics and National Security Study Module at the University Department of Forensic Sciences, University of Split
EDUCATIONAL DATA – Highest degree achieved	
Title	Doctor of Science
Institution	University of Rijeka, Faculty of Maritime Studies
Place	Rijeka
Date	2002.
ADVANCED EDUCATION	
Year	
Place	
Institution	
Field of study	
NATIVE LANGUAGES AND FOREIGN LANGUAGES	
Native language	Croatian
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	English, 4 (very good)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5	
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	

SUBJECT COMPETENCES	
Previous experience in teaching similar subjects (state the name of the subject, the study programme in which it was/is being taught, and the level of the study programme)	1. Hydrographic Engineering and Navigation Safety, University of Rijeka, Faculty of Maritime Studies, doctoral study 2. Maritime and Underwater Safety, University Department of Forensic Sciences, University of Split, graduate study 3. International Maritime Security System, Faculty of Maritime Studies, Split, graduate study 4. Navigation Integrated Systems, Faculty of Maritime Studies, Split, graduate study. 5. Hydrographic Engineering, Faculty of Maritime Studies, Split, graduate and undergraduate study 6. Ergonomics of Navigation Subsystems, Faculty of Maritime Studies, Split, graduate and undergraduate study. 7. Methodology of Scientific Research, University of Dubrovnik, Department of Maritime Studies, graduate study
Authorship of university/college textbooks in the subject area	
Professional, scientific and artistic works published in the last five years in the subject area (maximum 5 references)	1. Cvjetković, S., J., Kasum, J., Tokić, T., Lightning protection on non-covention vessels in dynamic conditions, *Journal of Engineering Research and Application* 8 (Issue 2), pp.68-74, 2018. 2. Jeličić, T., Modrić, D., Kasum, J., *Standardization of colours on charts,* International Scientific Conference Printing & Design, 2017 3. Russo, A., Urlić, J., Kasum, J., Human resources and their possible forensic meanings. *Psychiatria Danubina* 27 (1), 123-129, 2015 4. Pavić, I., Kasum, J., Perkušić, M., Organizational and Legal Aspects of International Hydrographic Activity, *Naše more*:, 61 (5-6), 117-123, 2014 5. Kasum, J., Cvjetković, S., J., Stanivuk, T., Dynamic Model for Calculating the VHF Radio Horizon at Sea, *Brodogradnja: Teorija i praksa brodogradnje i pomorske tehnike (Shipbuilding: Theory and practice of shipbuilding and maritime engineering)* 64 (4), 482-4873, 2013
Professional and scientific papers on teaching methodology and quality published in the last five years (maximum 5 references)	
Professional, scientific and artistic projects in the subject area that were carried out in the last five years (maximum 5	
Within which programme and to what extent did the holder acquire methodological-psychological-didactic-pedagogical	
RECOGNITIONS AND AWARDS	
Recognitions and awards for teaching and scientific work/artistic work	1. Plaque for contribution to the development of the University of Split 2. Plaque for contribution to the development of the Polytechnic of Šibenik

Title, name and surname	**Asst. Prof. Rino Bošnjak**
Subject taught in the proposed study programme	Synthesis of monitor systems in high-risk sea areas
GENERAL INFORMATION	
Address	Ulica 141. brigade 20, 21000 Split
Telephone	098 363 968
E-mail address	rino.bosnjak@pfst.hr
Personal website	
Year of birth	1975.
Personal identification number from the	328504
Scientific or artistic title and date of last election	scientific associate, 18. 10. 2017.
Scientific-teaching, artistic-teaching or teaching title and date of last election	assistant professor, 12. 1. 2018.
Field and field of election to scientific or artistic title	scientific associate in the field of technical sciences, field of traffic and transport technologies
DATA ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Maritime Studies, University of Split
Date of employment	1. 4. 2011.
Job title (professor, researcher, associate, etc.)	assistant professor
Field of work	nautical, surveillance systems VTS-u
Function	Deputy Director of the Training Center
EDUCATIONAL DATA – Highest degree achieved	
Title	Doctor of Science
Institution	Faculty of Transport Sciences in Zagreb
Place	Zagreb
Date	27. 4. 2017.
ADVANCED EDUCATION	
Year	2018.
Place	Bilbao, Spain
Institution	Nautical University in Bilbao
Field of study	nautical
NATIVE LANGUAGES AND FOREIGN LANGUAGES	
Native language	Croatian
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	English, 5 (excellent)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5	French, 3 (good)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	
SUBJECT COMPETENCES	
Previous experience in teaching similar subjects (state the name of the subject, the study programme in which it was/is being taught, and the level of the study programme)	. 1. Liquid Cargo Transport Technology, Undergraduate Study of Maritime Nautical Studies (PN), Faculty of Maritime Studies in Split . 2. Modern Transport Technologies, Undergraduate Study of Maritime Nautical Studies (PN), Faculty of Maritime Studies in Split . 3. Basic Safety, Undergraduate Study of Maritime Management (PM) and Maritime Technology of Yachts and Marinas (PTJM), Faculty of Maritime Studies in Split
Authorship of university/college textbooks in the subject area	

Professional, scientific and artistic works published in the last five years in the subject area (maximum 5 references)	1. Bošnjak, R.; Kezić, D.; Vidan, P.;Metodology of Synthesis of the Supervisor by using Petri Net, *Shipbuilding Theory and Practice of Naval Arhitecture, Marine Engineering and Ocean Engineering.* VOL 68 (2017), Number 3; 57-66. 2. Belamarić, G.; Kurtela, Ž.; Bošnjak, R.; Risk Analysis for Pollution by Oil in port of Sibenik with method of simulation, *Transaction on Maritime Science* (TOMS). VOL 5 (2016), Number 2; 141-145. 3. Bošnjak, R.; Šimunović, Lj.; Kavran, Z.; Automatic Identification System in Maritime Transport and Analysis of Errors, *Transaction on Maritime Science* (TOMS). VOL 2 (2012), Number 1; 77-84. 4. Vidan, P.; Grzadziela, A.; Bošnjak, R.; Proposal of Measures for Increasing the Safety Level in Inland Navigation, *Transaction on Maritime Science* (TOMS). VOL 1 (2012), Number 2; 85-88. 5. Belamarić, G.; Kurtela, Ž.; Bošnjak, R.; Risk Analysis for Marine Accident in Port of Šibenik, *Naše more* – International Journal of Maritime Science & Technology, Vol (63), Number 4 (2016), 87-97.
Professional and scientific papers on teaching methodology and quality published in the last five years (maximum 5 references)	
Within which programme and to what extent did the holder acquire methodological-psychological-didactic-pedagogical	
RECOGNITIONS AND AWARDS	
Recognitions and awards for teaching and scientific	

Title, name and surname	**Asst. Prof. Ivica Pavić**
Subject taught in the proposed study programme	Methodology for maritime operations design
GENERAL INFORMATION	
Address	Lovretska 10, Split
Telephone	0915914048
E-mail address	ipavic71@pfst.hr
Personal website	
Year of birth	1971.
Personal identification number from the	307130
Scientific or artistic title and date of last election	scientific associate, 15. 6. 2016.
Scientific-teaching, artistic-teaching or teaching title and date of last election	assistant professor 28. 2. 2017.
Field and field of election to scientific or artistic title	technical sciences, traffic technology and transport, maritime and river transport
DATA ON CURRENT EMPLOYMENT	
Institution of employment	University of Split, Faculty of Maritime Studies
Date of employment	3. 7. 2017.
Job title (professor, researcher, associate, etc.)	professor
Field of work	technical sciences, traffic technology and transport, Institute of Maritime Nautical Studies
Function	professor
EDUCATIONAL DATA – Highest degree achieved	
Title	Doctor of Science
Institution	University of Rijeka, Faculty of Maritime Studies
Place	Split
Date	1. 6. 2012.
ADVANCED EDUCATION	
Year	2010.
Place	Zagreb
Institution	Command and Staff School "Blago Zadro", Croatian Military Academy
Field of study	interdisciplinary field of military-defence and security-intelligence sciences and arts
NATIVE LANGUAGES AND FOREIGN LANGUAGES	
Native language	Croatian
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	English, 4 (very good)
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	
SUBJECT COMPETENCES	
Previous experience in teaching similar subjects (state the name of the subject, the study programme in which it was/is being taught, and the level of the study programme)	Passenger Transport Technology, Maritime Nautical Studies – Undergraduate Study Hydrographic Engineering I and II, Maritime Yacht and Marina Technologies – Graduate Study Hydrographic Engineering, Maritime Nautical Studies, Maritime Electrical and Information Technologies – Graduate Study Safety at Sea, Marine Engineering, Maritime Electrical and Information Technologies – Undergraduate Study

Authorship of university/college textbooks in the subject area	
Professional, scientific and artistic works published in the last five years in the subject area (maximum 5 references)	1. Pavić, I.: *Izraelski pristup operativnom dizajnu u kampanji protiv Hezbollaha 2006*., Diplomski rad, Zapovjedno-stožerna škola "Blago Zadro", Hrvatsko vojno učilište (Israeli approach to operational design in the campaign against Hezbollah 2006, Graduation thesis, Command and Staff School "Blago Zadro", Croatian Military Academy), Zagreb, 2010. 2. Pavić, I., Mišković, J., Pomorska blokada tijekom Izraelsko-Libanonskog sukoba 2006., Izvorni znanstveni članak, *Adrias*, Zbornik zavoda za znanstveni i umjetnički rad Hrvatske akademije znanosti i umjetnosti (Naval Blockade during the Israeli-Lebanese Conflict of 2006, Original scientific article, Adrias, Proceedings of the Institute for Scientific and Artistic Work of the Croatian Academy of Sciences and Arts), Vol. 17, 2010, Zagreb – Split, 2010.
Professional and scientific papers on teaching methodology and quality published in the last five years (maximum 5 references)	
Professional, scientific and artistic projects in the subject area that were carried out in the last five years (maximum 5	
Within which programme and to what extent did the holder acquire methodological-psychological-didactic-pedagogical	
RECOGNITIONS AND AWARDS	
Recognitions and awards for teaching and scientific	

Title, name and surname	**Assoc. Prof. Zvonimir Lušić**
Subject taught in the proposed study programme	Maritime route planning
GENERAL INFORMATION	
Address	Vinkovačka 13, Trogir
Telephone	0
E-mail address	zlusic@pfst.hr
Personal website	
Year of birth	1971
Personal identification number from the	288482
Scientific or artistic title and date of last election	senior scientific associate 15. June 2016
Scientific-teaching, artistic-teaching or teaching title and date of last election	associate professor 14/12/2016
Field and field of election to scientific or artistic title	field of technical sciences, field of traffic and transport technologies, maritime and river
DATA ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Maritime Studies, University of Split
Date of employment	01/05/2005.
Job title (professor, researcher, associate, etc.)	associate professor
Field of work	maritime navigation
Funkcija	Head of the Department of Nautical Sciences
EDUCATIONAL DATA – Highest degree achieved	
Title	Doctor of Science
Institution	Faculty of Maritime Studies in Rijeka
Place	Rijeka
Date	19/07/2010
ADVANCED EDUCATION	
Year	2013, 2017
Place	Portorož/Gdynia
Institution	Portorož Maritime Faculty, Gdynia Maritime University
Field of study	Application of navigation simulators in research and teaching
NATIVE LANGUAGES AND FOREIGN LANGUAGES	
Native language	Croatian
Foreign language and language proficiency on a scale from 2 (sufficient) to 5 (excellent)	English, 3 (good)
SUBJECT COMPETENCES	
Previous experience in teaching similar subjects (state the name of the subject, the study programme in which it was/is being taught, and the level of the study programme)	- Navigation I, II, III, IV, Maritime Nautical Studies, two-year/four-year university study - Maritime Navigation Systems and Processes I, II, III, IV, Maritime Systems and Processes, four-year university study - Terrestrial Navigation, Maritime Nautical Studies/Maritime Management/Marine Yacht and Marina Marine Technologies/Maritime Systems and Processes, undergraduate university study - Astronomical Navigation, Maritime Nautical Studies/Maritime Management/Maritime Yacht and Marina Technologies/Maritime Systems and Processes, undergraduate and graduate university studies - Management of navigation and surveillance systems, Maritime Nautical Studies - graduate study

Authorship of university/college textbooks in the subject area	Lušić, Z.: Astronomical navigation-script, Faculty of Maritime Studies in Split, 2012. Lušić, Z.: Terrestrial navigation-authorized lectures, Faculty of Maritime Studies in Split, 2012. Lušić, Z.: Elements of navigation-authorized lectures, Faculty of Maritime Studies in Split, 2017.
Professional, scientific and artistic works published in the last five years in the subject area (maximum 5 references)	1. Lušić, Z.: Astronomical position without observed altitude of the celestial body", The Journal of Navigation (0373-4633), 71 (2018), 454-466. 2. Lušić, Z.; Pušić, D., Čorić, M.: Maritime Traffic on Approach to Port of Split and Assessment of Collision and Grounding Risk, Transactions on Maritime Science (TOMS) (ISSN1848- 3305) Vol. 5, No. 2 (2016), 130-140. 3. Lušić, Z.; Čorić, M.: Models for Estimating the Potential Number of Ship Collisions, The Journal of Navigation (0373- 4633) 68 (2015); 735-749. 4. Lušić, Z., Kos, S., Galić, S. Standardisation of Plotting Subjects and Selecting Turning Points in Maritime Navigation, PROMET – Traffic &Transportation. 26 (2014), 4; 313-322 5. Lušić, Z.; Kos, S.: Ranking of sailing routes according to the potential number of groundings, Transport 28 (2013)-3, 295- 301.
Professional and scientific papers on teaching methodology and quality published in the last five years (maximum 5 references)	1. Galić, S.; Lušić, Z.; Pušić, D.: Seafarers Market, New Trends on Global Education Conference 2011, Kyrenia - North Cyprus, International Journal of New Trends in Arts, Sports & Science Education (IJTASE), 2012. 33-39. 2. Lušić, Z.: Novi preddiplomski studij Pomorske nautike na Pomorskom fakultetu u Splitu (New undergraduate study programme in Maritime Nautical Studies at the Faculty of Maritime Studies in Split), Kapetanov glasnik 29-2014, HHI/PFST, Split, 2014, 22-25.

Professional, scientific and artistic projects in the subject area that were carried out in the last five years (maximum 5 references)	Scientific project RESEARCH OF THE CORRELATION OF MARITIME AND TRANSPORT ELEMENTS IN MARITIME TRAFFIC) (112-1121722-3066) - project collaborator - International scientific project TEMPUS "Modernizing and harmonizing maritime education in Montenegro and Albania" MarED, Applicant University of Montenegro, Partner University of Split (leader for PFST and UNIST izv. prof. dr. sc. Pero Vidan), dr.sc. Zvonimir Lušić in the status of researcher. - Traffic and navigation study - navigable area of Split, Ploče and Dubrovnik, responsible Ministry of Maritime Affairs, Transport and Infrastructure, contractor Faculty of Maritime Affairs in Rijeka, leader prof. dr.sc. Damir Zec; authors dr. sc. Vlado Frančić, dr. sc. Igor Rudan, dipl. ing. Lovro Maglić, dr. sc. Zvonimir Lušić, dipl. ing. Ivica Đurđević-Tomaš, dipl. ing. Miloš Brajović, dipl. ing. Mate Vukić; Rijeka, 2014. - Maritime study for concession fields-fish farms in the zone Lamjana (G, B, VŠ1, VŠ2, VŠ3), client Cromaris d.d., presented by Maritime Faculty in Split, leader doc. dr. sc. Zvonimir Lušić, presenters doc.dr.sc. Zvonimir Lušić, Danijel Pušić, mag.ing.naut., assoc. prof. dr. sc. Pero Vidan, assoc. prof. dr. sc.
	- Maritime study for the installation of a pontoon for seaplane reception on the part of the Knez Domagoj coast in the Split City Port, commissioned by European Coastal Airlines d.o.o., contractors Assoc. Prof. Dr. Sc. Pero Vidan, Assoc. Prof. Dr. Sc. Zvonimir Lušić, Danijel Pušić, Mag. Eng.naut., Assoc. Prof. Dr. Sc. Merica Slišković, Ružica Popović, Mag. Eng., leader Assoc. Prof. Dr. Sc. Pero Vidan., Split, 2015. - Maritime study for the intervention in the space-breeding of white sea fish at the location Zaglavić in the Lamjana bay, commissioned by Cromaris d.d., contractors Assoc. Prof. Dr. Sc. Zvonimir Lušić, Danijel Pušić, Mag. Eng.naut., Assoc. Prof. Dr. Sc. Pero Vidan, Assoc. Prof. Dr. Sc. Merica Slišković, Ružica Popović, Mag. Eng., leader Assoc. Zvonimir Lušić, Split, 2015.
Within which programme and to what extent did the holder acquire methodological-psychological-didactic-pedagogical competencies?	Experience in teaching, training and education of seafarers since 2002, six years of sailing on ships, and as part of regular education.
RECOGNITIONS AND AWARDS	
Recognitions and awards for teaching and scientific work/artistic work	

2.9. Optimal number of students

Considering the human and spatial capabilities, it is considered that the successful implementation of the curriculum of the university postgraduate study programme in Maritime Technology can be carried out with a maximum of 15 students, and the optimal number of students for which a cost estimate has been made is five students per academic year.

2.10. Estimated study costs per doctoral student

Doctoral students selected for the associate assistant title and employed at the Faculty do not bear the regular cost of study (hereinafter referred to as the tuition fee). The tuition fee is subsidized by available funds from the state budget. If funds from the state budget do not cover their study costs, the difference is borne by the Faculty.
Doctoral students selected for the associate assistant title and employed at another higher education institution or scientific institution pay the tuition fee, other study costs and material costs of the doctoral dissertation themselves or are paid by the institution that sends them to study.
Doctoral students who are not selected for the associate assistant title pay the tuition fee, other study costs and material costs of the doctoral dissertation themselves or are paid by the legal entity that sends them to study.
Tuition fee, tuition fee for doctoral students who are foreign citizens and other study costs, as well as the method and deadlines for payment, are determined by special decisions of the Faculty Council.

The registration fee covers the cost of studying related to the following:

- research
- dissemination of scientific research results
- organization of teaching
- organization of public discussions
- defence of dissertations
- administration costs.

Funds from postgraduate study fees are spent as prescribed by the Ordinance on the criteria and method of using income of public higher education institutions and public scientific research institutes generated on the market from performing activities, in the following manner:

- 60% of the income is directed towards the purchase of scientific and research equipment and research work
- 40% towards other expenses; other activities include the work of committees and teaching by guest lecturers.

1. Tuition fees are spent for specific purposes, i.e. 67.0% for the scientific research work of doctoral students (scientific equipment) and for other tasks (33.0%).
2. Other tasks include the work of committees and teaching by guest lecturers:
    2.1. The cost of holding a Subject through consultations is 5.5% gross per doctoral student for foreign lecturers (for the total hourly rate)
    2.2. Faculty teachers perform classes within the regular norm in a way that overtime is paid according to the University's Regulations for calculating hourly rates
    2.3. Public discussion 8.0%
    2.4. Doctoral thesis defense 19.0% per doctoral student
    2.5. Other costs 0.5% per doctoral student.

The total costs and their structure for five enrolled students are shown in Table 3.

Table 4. Cost distribution (HRK)

Costs	Number of activities	Unit cost	Cost per item
Costs for scientific research	5	50.000,00	250.000,00
Foreign lecturer	5	4.000,00	20.000,00
Costs for public speaking	5	6.000,00	30.000,00
Costs for doctoral thesis defence	5	14.000,00	70.000,00
Administrative costs	5	500,00	2.500,00
TOTAL (HRK)			372.500,00

The costs of the printed doctoral thesis and any translation are paid by the doctoral candidate.

2.11. Method of monitoring the quality and success of the study programme implementation

The quality and success of the performance is continuously monitored by the head of the doctoral study, who reports to the Postgraduate Study Council. The Postgraduate Study Council reports on its work to the Faculty Council. The quality of the doctoral study is systematically monitored by the Faculty Quality Committee and the University of Split Quality Centre.

According to the European standards and guidelines for internal quality assurance in higher education institutions (according to the "Standards and Guidelines for Quality Assurance in the European Higher Education Area"), on the basis of which the University of Split determines quality management procedures, the proponent of a study programme is obliged to draw up a plan of quality assurance procedures for the study programme.	
Documentation on which the component's quality assurance system is based:	
• Regulations on the University Quality Improvement System	
• Handbook on the Faculty Quality Assurance System	
• Regulations on Studying at the University of Split	
• Regulations on the Faculty Doctoral Studies	
Description of procedures for evaluating the quality of study programme implementation: • for each procedure, it is necessary to describe the method (most often a survey for doctoral students or teachers, a self-evaluation questionnaire), specify the performers (compiler, university office), the method of processing the results and informing, and the implementation timeline • if it is described in an attached document, specify the name of the document and the article.	
Evaluation of the work of teachers and associates	• Doctoral evaluation of teaching and teaching quality through a survey. • The survey is organized and conducted by the University Quality Centre. • The survey is conducted every semester. • The aggregate results of the survey are presented to the Postgraduate Study Council.

	All procedures are carried out according to the Regulations on the organization and role of the quality management system of the University of Split and the Faculty of Maritime Studies in Split, according to the Regulations on the procedure for evaluating the quality of teachers and teaching by students of the University of Split, and according to the Regulations on the quality improvement system of the constituents.
Monitoring assessment and its alignment with expected learning outcomes	The Postgraduate Studies Committee monitors the alignment of assessments with learning outcomes.
Evaluating the availability of resources (spatial, human, information) for the learning and teaching process	• Doctoral evaluation of the work of administrative and professional services and the infrastructure for learning and student life through an electronic survey. • The evaluation is carried out through an online questionnaire that doctoral students complete in all years of study, except the final years. • The survey is organized by the Centre for Quality Improvement of the University of Split. • The processing of the survey results is carried out electronically at the University. • The survey is conducted every year. • The survey results are presented at the Faculty Council of the Faculty of Maritime Studies in Split.
Availability and evaluation of support for doctoral students (mentoring, tutoring, counselling)	• Doctoral students have access to administrative and professional services to support their work. • The Faculty Council, upon the proposal of the Postgraduate Study Committee, appoints a mentor who is a teacher of the doctoral study. The mentor provides advice to the doctoral student during the doctoral study, especially in the selection of subjects and the preparation of the dissertation. After each academic year, the mentor submits a report on the doctoral students work to the Postgraduate Study Committee. The doctoral student is obliged to submit a report on his/her work to the mentor once a year.
Monitoring of passing rates by subject and for the entire study programme	• Analysis of pass rates by subjects and studies is conducted once a year. • Analysis of pass rates by studies is conducted by the University in cooperation with the Commission. • The results of both analyses are presented at the meetings of the Faculty Council.
Participants' satisfaction with the programme as a whole	• Evaluation of the work of administrative and professional services and the infrastructure for learning and student life is carried out by students through an electronic survey. • Evaluation is carried out through an online questionnaire that students - doctoral students complete upon completion of their studies. • The survey is organized by the Centre for Quality Improvement of the University of Split. • The survey results are processed electronically at the University. • The survey results are presented at the meetings of the Faculty Council.
Procedures for obtaining feedback from external stakeholders (alumni, employers, labour market and other relevant organizations)	• Once a month, a member of the Board meets with the alumni presidents. • Once a year, roundtables and workshops are organized with employers and other stakeholders.
Other evaluation procedures carried out by the proposer	• An Internal Periodic Quality System Assessment is conducted once a year. • A Self-Analysis is conducted every five years.

Description of the procedures for informing external stakeholders about the study programme (doctoral students, employers,	• Website: www.pfst.hr • Media presentation

3. Organization of doctoral studies

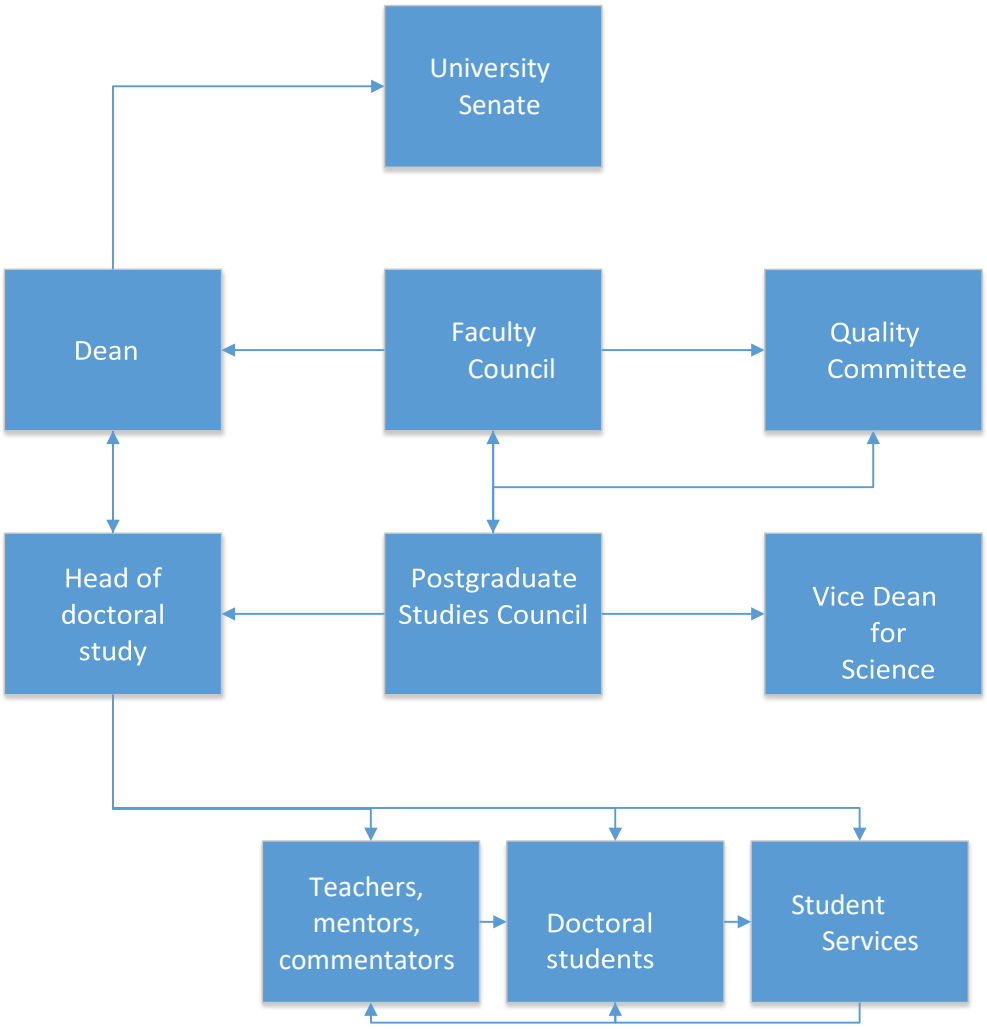

Figure 1. Organization of the doctoral study programme

The implementation of studies is supervised by the competent authorities:

- • Dean
- • Faculty Council
- • Postgraduate Study Committee
- • Head of Postgraduate Study
- • Student Services.

The Faculty Council performs the following tasks within the study programme:

- • announces the competition for admission
- • decides on implementation depending on the number of doctoral students
- • entrusts the implementation of teaching
- • appoints the head of the study

- appoints members of the Postgraduate Study Committee
- approves the mentor and possible co-mentor of the doctoral dissertation
- approves the topic of the doctoral dissertation
- appoints expert committees for accepting the topic, evaluating and defending the doctoral dissertation
- considers and adopts the reports of the Postgraduate Study Committee
- considers and decides on the cost of the study
- makes decisions on the suspension of doctoral obligations
- proposes amendments to the study programme
- determines the holders of new Subjects
- resolves teaching, organizational, financial, technical and other issues related to the successful implementation of the postgraduate study.

The Faculty Council appoints the Postgraduate Studies Committee (hereinafter referred to as: The Committee) as its permanent working body.
The Committee consists of 5 members, chaired by the head of the study programme. The Committee performs the following tasks:

- drafts a proposal for teaching at the study
- prepares proposals for regulations and other regulations on studies
- conducts the tender process and enrols doctoral students in the Subject
- resolves student requests upon authorization of the dean
- performs other tasks related to the organization and implementation of studies
- proposes to the dean and the Faculty Council the material management of the study
- prepares materials for the sessions of the Faculty Council within its jurisdiction.

The head of a postgraduate university study programme (hereinafter referred to as the head) is the president of the Commission.
The head is appointed by the Faculty Council upon the proposal of the dean, primarily from among full or associate professors, and his mandate coincides with the mandate of the dean.
The head coordinates the work of teachers on a particular study programme and performs other tasks related to the organisation and implementation of the study programme, and reports to the Commission and the Faculty Council on this.

Student Services leads:

- records of registered doctoral candidates for the enrolment process, including the results of the process
- personal records of enrolled students
- records issued certificates of completion of studies and acquired academic degrees and titles
- archives application forms for passed exams
- ensures other conditions for the administrative operations of the study.

The Committee, in agreement with the doctoral candidate, proposes a doctoral dissertation mentor to the Faculty Council.
The mentor may be a faculty member elected to a scientific-teaching position who has published at least three scientific papers in journals indexed in the Web of Science databases in the last five years in the scientific field of the doctoral dissertation.
The mentor has a scientific-teaching position in a technical scientific field. It is the mentor's obligation to prepare a financial plan with a research flowchart for the doctoral candidate before enrolling in the study. The suitability of the mentor is assessed by the Committee and approved by the Faculty Council. The mentor may be a professor emeritus.
The Faculty Council decides on the number of doctoral candidates that the mentor may supervise at the same time. Before taking on the first mentorship, it is necessary to complete a mentoring workshop organized by the University or recognized international schools.
A doctoral candidate may be assigned a scientist outside the Faculty who meets the criteria from the previous paragraphs of this article as a mentor.
A mentor who is not an employee of the Faculty must sign a mentoring agreement with the Faculty.

In order to ensure the quality of the doctoral dissertation, co-supervision may be provided, if necessary (for example: interdisciplinary research, conducting research in multiple institutions).
The mentor and co-supervisor who took over the mentorship before retirement may bring that mentorship to an end, which is decided by the Faculty Council.
The Faculty Council decides on the appointment of the mentor and co-supervisor of the doctoral dissertation.

The mentor helps the doctoral candidate in choosing Subjects from the study programme, directs him to the literature and the application of appropriate scientific and research methods, helps the doctoral candidate in choosing a topic and writing a doctoral dissertation, monitors the quality of his work, and encourages and assists in writing scientific papers.

The committee, in agreement with the mentor and the doctoral candidate, may propose one co-supervisor to the Faculty Council.
The mentor is obliged to submit a report on the doctoral candidate's work to the supervisor once a year. The mentor/commentator may submit a reasoned request for termination of mentorship/commentary to the Faculty Council, which may relieve him of mentorship/commentary.

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3. http://www.unist.hr/Portals/0/docs/.../UNIST_STRATEGIJA_2015_2020_.pdf
4. http://www.unist.hr/Portals/0/docs/ostali%20dokumenti/Znanstveni%20%C4%8D casopisi.pdf

Attachment 1.

HRVATSKI REGISTAR BRODOVA
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OIB: 04601923208

SVEUČILIŠTE U SPLITU
POMORSKI FAKULTET

n/p Izv.prof.dr.sc.Nikola Račić, dekan

Ruđera Boškovića 37, 21000 SPLIT

U: *At:* Splitu, dne: *date:* 2018-08-24

Naš znak: *Our ref.:* 194/D/DR

Vaš znak: *Your ref.:* 1938/2018

PREDMET: Osnivanje poslijediplomskog sveučilišnog studija Tehnologije u pomorstvu

Poštovani gospodine Račić,

Vašu namjeru osnivanja poslijediplomskog studija Tehnologije u pomorstvu koji bi bio namijenjen doktorandima koji su vezani uz pomorsku industriju i znanost u pomorstvu kao i ishode učenja koje navodite u Vašem pismu smatramo odličnom idejom i potrebom koju u cijelosti podržavamo.

Isto tako iskazujemo zainteresiranost i moguću potrebu zapošljavanja budućih doktoranada u Hrvatskom registru brodova, a kao nastavna baza Sveučilišta i dugogodišnji partner iskreno se veselimo i nadamo što skorijem osnivanju poslijediplomskog studija Tehnologije u pomorstvu na Vašem fakultetu.

Srdačno Vas pozdravljamo,

Damir Roje

Ravnatelj

QF-A-01, v. 2010-01

2.

HRVATSKI HIDROGRAFSKI INSTITUT
HYDROGRAPHIC INSTITUTE OF THE REPUBLIC OF CROATIA
HR-21000 Split, Hrvatska, Zrinsko-Frankopanska 161
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www.hhi.hr

Klasa: 640-03/18-01/01
Urbroj: 561-01-18- 2545
Split, 25.07.2018.

Sveučilište u Splitu
Pomorski fakultet
Ruđera Boškovića 37
21 000 Split

n/p dekan
izv.prof.dr.sc. Nikola Račić

Predmet: Osnivanje poslijediplomskog sveučilišnog studija Tehnologije u pomorstvu - mišljenje, dostavlja se

Poštovani,

Nastavno na zaprimljeni dopis od 18. srpnja 2018. godine, Broj: 1339/2018, a u svezi mišljenja nastavno na osnivanje poslijediplomskog sveučilišnog studija Tehnologije u pomorstvu obavještavamo Vas da Hrvatski hidrografski institut podržava potrebu za osnivanjem ovakve vrste studija s obzirom na očekivani karakter i sadržaj istoga.

Hrvatski hidrografski institut doprinosi povećanju stupnja sigurnosti plovidbe u području hidrografske djelatnosti i to hidrografskim istraživanjem mora, morskog dna i podmorja, obradom i javnom objavom službenih pomorskih navigacijskih karata, priručnika i drugih informacija u skladu sa međunarodnim i domaćim propisima i normama te ima i potrebe svoje stručne kadrove usmjeravati na daljnju edukaciju i školovanje te smatramo da bi ovakva vrsta studija bila korisna i za potrebe HHI-a, a s obzirom da se bavi pomorskom strukom i znanošću.

POMORSKI FAKULTET U SPLITU
Primljeno: 27.8.2018 Broj 1414/2018

S poštovanjem,

Ravnateljica
Vinka Kolić, mag.ing.admin.nav.

HRVATSKI HIDROGRAFSKI INSTITUT SPLIT, HRVATSKA

PLOVPUT d.o.o.
trgovačko društvo s ograničenom odgovornošću za održavanje pomorskih plovnih putova i radijske službe
Obala Lazareta 1, HR-21000 SPLIT, tel: + 385 (0)21 390 600, faks: + 385 (0)21 390 630, e-mail: plovput@plovput.hr, web: www.plovput.hr
Uprava: tel: + 385 (0)21 390 601, faks: + 385 (0)21 390 690
Sektor sigurnosti plovidbe: tel: + 385 (0)21 490 707, faks: + 385 (0)21 490 712, e-mail: sigurnostplovidbe@plovput.hr
Sektor za održavanje - Baza: tel: + 385 (0)21 490 415, faks: + 385 (0)21 490 413, e-mail: odrzavanje@plovput.hr

Broj: 1- 2672/18
Split, 27. 08.2018.godine

POMORSKI FAKULTET
Dekan
Izv.prof.dr.sc. Nikola Račić
Ruđera Boškovića 37
21 000 Split

Poštovani izv. prof. dr. sc. Račić,

U ime PLOVPUTA izražavam pozitivno mišljenje o ideji osnivanja poslijediplomskog sveučilišnog studija Tehnologije u pomorstvu – koji bi se izvodio na Pomorskom fakultetu Sveučilišta u Splitu.
Budući bi navedeni studij bio vezan za pomorsku industriju i bio međunarodnog karaktera procjenjujem kako bi osposobio znanstvenike s kompetencijama najviših razina.
Takav izniman kadar potencijalno je potreban PLOVPUTU kako bismo potaknuli istraživanja i razvoj novih tehnologija i ideja, unaprijedili poslovne procese i time doprinijeli razvoju tvrtke u cjelini. U dugoročnom razdoblju mogli bismo planirati angažiranje 1-2 doktora znanosti s budućeg studija Tehnologije u pomorstvu.

Želim Vam uspješnu realizaciju ovog projekta i potporu ostalih gospodarskih subjekata kako bi se aktivno sudjelovanje doktora znanosti u segmentu gospodarstva povećalo sa sadašnjih 15% u odnosu na ukupan broj radno aktivnih doktora znanosti.
Podršku novom studiju tvrtka PLOVPUT u okviru svojih mogućnosti spremna je iskazati i stavljanjem svojih resursa na raspolaganje.

S izrazima poštovanja.

Direktor:
dr.sc. Mate Perišić, dipl.ing.

PLOVPUT d.o.o. Split br. 18

Društvo je upisano u sudski registar Trgovačkog suda u Splitu, MBS: 060132809, MB: 3129489, OIB: 14480721492. Temeljni kapital iznosi 111.546.200,00 kuna i uplaćen je u cijelosti.
Direktor Društva dr.sc.Mate Perišić, dipl.ing.
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