




ANALYSIS OF THE PROPOSED STUDY PROGRAMME

1. GENERAL INFORMATION ON THE STUDY PROGRAMME			
Name of the study programme	Chemistry and Chemical Engineering		
Proponent of the study programme	Faculty of Chemistry and Technology		
Co-proponent of the study programme			
Type of the study programme	Vocational/professional study programme <input type="checkbox"/>		University study programme <input checked="" type="checkbox"/>
Study programme level	Undergraduate <input type="checkbox"/>	Graduate <input type="checkbox"/>	Integrated <input type="checkbox"/>
	University Postgraduate <input checked="" type="checkbox"/>	Specialist Postgraduate <input type="checkbox"/>	Specialist Graduate <input type="checkbox"/>
Academic/vocational title acquired upon completion of the study programme			


2. GENERAL SECTION	
Are the reasons for initiating the proposed study programme justified?	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<p>Explanation:</p> <p>The origin of the programme is situated in two already existing PhD programmes, named "Chemical Engineering in Material Development and Environmental Protection" since 2001 and "Chemistry of the Mediterranean Environment" since 2012. Even though the general trend for PhD programs is towards specialization, during the re-accreditation process the Agency for Science and Higher Education made several recommendations for improvement. One of them was a thorough reorganization and the suggestion of merging the two study programmes into a single one. That will enable an optimized use of the human resources and research capabilities, and also the possibility of reaching the minimum number of students needed to open a subject for teaching. So, in my opinion this is a good reason to merge the two programmes into a new one.</p> <p>The programme is based in the knowledge and expertise of the professors that will be acting as mentors/supervisors. Since this aspect was already accredited for the previous programs and re-accreditation gave the high marks for quality –justification, resources, teachers, mentors, etc., this aspect of the new programme is also assured in the new one.</p> <p>Finally, the cross-nature of research between basic and applied research is also appointed and used as a connecting thread, that is also linked to the socioeconomic characteristics of the area where the programme is going to be implemented, where materials, manufacturing, refinery, winery, production of essential oils or marine resources use are just some examples where chemical engineering and chemistry go by hand. Accordingly, the general subject of this new program is more than appropriate.</p> <p>In conclusion, the new program is well justified from three different viewpoints: need of highly qualified professionals in the area, existence of human and technical</p>

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	resources based in the experience of the two previous PhD programs, and suggestions made by the Agency for Science and Higher Education.
Do the contents of the proposed study programme pertain to the stated field of science/arts?	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<p>Explanation:</p> <p>The proposed study programme is coherent with the fields of Chemistry and Chemical Engineering. The description provided of the subjects clearly shows that they are in good accordance with these two fields, and so it is the background and experience of teachers and mentors.</p>
Does the study programme have a purpose, with regards to the needs of the labour market?	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<p>Explanation:</p> <p>The program clearly states in section No. 1.2 and 2.3 that the needs of the local community, the Croatian society and the national strategy for the development of science and education have been taking into account when designing this new program. It combines the contents of basic and applied natural sciences in economic areas of importance to the labour market such as analysis, natural products, polymers and organic synthesis with those of applied technical sciences on areas such as cement and materials, polymers, environmental sciences (bioenergy, waste waters treatments, remediation). Emphasis is done in the needs at the regional level in order to prevent brain draining and help talent to root in the area, both in the Higher Education area field and in the industry. Moreover, section 1.4 also includes several institutions, companies and associations that have shown interest and could be also receptors/employers of the alumni of the programme.</p> <p>Suggestions: 1) Regarding the connection with the labour market, have the proponents considered the possibility of doctoral studies in the industry? PhD students developing their research both in the industry and at FCT in subjects of interest for the industry will help employability, innovation, and a closer connection between the Academia and the Industry. The characteristics and subjects covered in this PhD programme are especially adequate for such an approach, in connection with the economic needs and industry of the region.</p>
Is the study programme comparable to study programmes of EU member states?	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<p>The structure is similar to other doctoral programmes inside the EU. As a Spanish evaluator, the structure of the study programme is similar to those of my University with a core group of general subjects about scientific methodology, handling of literature, and basic of statistics and chemometrics. The mandatory subjects are complemented with a choice of subjects in each area. The workload in terms of ECTS is also comparable to other study programmes in EU, and so it is the way in which other activities are weighted and evaluated –e.g., publications, courses, public defence of the research plan, etc. It is worth highlighting the mandatory requirement of one scientific publication in WoS. The number of hours (ECTS) assigned to each course/activity is similar to those in other study programmes in EU and so it is also the general structure.</p> <p>Question/suggestions. 1) In order to improve the quality of the research production, the scientific paper should be included in Q1 or, at least, Q2 or Q1. 2) In order to assure visibility and the career development of the student, he/she should be the first author of the paper (Table 2, No. 1) or of the scientific conference (first author and presenter, Table 2, No 6); 3) I think that the text is not clear enough regarding the PhD Degree that the student will obtain I have read the proposal several times and it is not clear whether the student will get a degree in Chemistry, Chemical Engineering or both. Could this part be more elaborated or stated clearly what will be the degree obtained and how it will be selected by the student. I understand that the student can take classes from both areas.</p>
Is the study programme comparable to study programmes in the Republic of Croatia?	


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<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Explanation: I have compared the structure and contents of this proposal with those of other PhD programmes in Croatia, named the programme in Chemistry from the University of Zagreb. The structure is similar with two general and compulsory subjects worth 8 ECTS and another two generic courses in Chemistry worth 16 ECT; the rest up to 36 ECTS are elective courses organized in 4 areas of expertise. Participation in elective activities include seminars, workshops, etc. The structure and length of 3 years, is similar, and so it is the possibility of extension up to 5 years (6 years in the case of Split). Requirements as having at least one scientific paper in WoS are similar. In the case of the PhD programme of Split, I understand that the structure is based in the previous separated programmes of Chemistry and Chemical Engineering, that were approved by Accreditation Council of the Ministry of Science and Education.
Is the study programme open to student mobility (horizontal, vertical within Croatia and international)?	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Explanation: The proposal follows the principles of the Bologna Process. Therefore, it should be compliant with international mobility. Actually, the programme includes a specific section for student mobility (1.7). For local students, completion of compulsory courses is a prerequisite for mobility. Nevertheless, the possibility of enrolment in courses in other Universities inside or outside of Croatia is also included upon approval of the Postgraduate University Doctoral Study Committee (section 2.8). Hence, mobility is envisioned as part of their second or third year activities; several recognition of activities possibilities are given (Table 2): research in other Croatian (No 11, 5 ECTS) and international (No. 12, 10 ECTS) scientific institutions, attendance of scientific and professional lectures (No. 13, 1 ECTS, max 3 ECTS). Suggestion. Internationalisation is a key issue for any HE study program, and even more important in PhD programmes. 1) University of Split belongs to the European University of the Seas – SEA-EU; this is a strong alliance that promotes mobility and international cooperation in teaching and research. I miss some mentions to how the programme will take advantage of this opportunity. 2) Also, I miss identification of potential EU with which the program could establish Erasmus+ mobility agreements to boost incoming and outgoing mobility, or at least the intention of looking for strategic partnerships in this area.
Is continuation of education possible afterwards?	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Explanation: A PhD programme is the highest level of education that any student can achieve in any Higher Education system. Nonetheless, long-life learning is a must for all professionals and scientists. In this sense, the program gives the student the skills and tools to keep on going with his learning process as a professional of Chemistry or Chemical Engineering in the Academia, the teaching sector or the industry. Also, the design of the programme is adequate in the case the alumni choose to perform a post-doctoral stay in other University inside or outside of Croatia.
Have the learning outcomes been determined in accordance with the demands of the labour market, vocational associations and general needs of the society?	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Explanation: The subjects selected for the program are in line with some of the most important economic sectors of Croatian in the field of chemistry and chemical engineering: research and development of environmentally friendly materials and sustainable technologies, profiling and potential of natural organic compounds, and development of advanced methods of analysis. All of them are needs of the society and are closely connected with the region. Just to give an example, analytical methodologies are needed for water treatment and quality, quality control of manufactured components, or food quality in crops and sea products. The program also details possible partners outside the HES that could also host some of the Alumni of the program (1.4). Also, Section 1.3 explains that the proposal is in line with the recommendations of the Croatian Chemical Society (HKD) and the Croatian Society of Chemical Engineers and Technologists (HDKI).

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Does the study programme anticipate cooperation with scientific institutes, the economy and public sector?	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<p>Explanation:</p> <p>Section No. 1.4 details possible partners outside the HE system that are interested in or are already collaborating as a teaching basis with the proponent of the study programme –FCT. Among them, public institutes of important economic and research areas such as fisheries, medicinal products, public health, or the Ruder Boskovic Institute clearly show the connection of the program with the Croatian society in the areas where the PhD programme will focus.</p> <p>Suggestions. 1) As stated in 2.3, regarding the connection with the labour market, have the proponents considered the possibility of doctoral studies in the industry? PhD students developing their research both in the industry/other research institutes and at FCT in subjects of interest for the industry will help employability, innovation, and a closer connection between the Academia and the Industry. This modality is used in Spain and it allows the cooperation with Industry. 2) Have the proponents considered the possibility of co-direction of thesis where the co-director/co-supervisor will be an employee outside of FCT, e.g. from another Croatian research institute, company, or from another University outside of Croatia? Does the legal framework of Croatian legislation allow it? 3) I would include a mention to the potential cooperation with research institutes within the SEA-EU alliance.</p>


3. DESCRIPTION OF THE STUDY PROGRAMME	
Are the learning outcomes on both the study programme and the course level clearly presented and possible to implement?	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<p>Explanation:</p> <p>The learning outcomes of the programme are clearly listed in section 2.2 and are compliant with Croatian Qualifications Framework. All the compulsory and elective courses have explicitly detailed the learning outcomes and are in good accordance with their contents as described in the corresponding worksheets.</p>
Do learning outcomes correspond to the acquisition of skills necessary for the next level of study?	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<p>Explanation:</p> <p>There is no next level of study. However, the skills acquired during the study programme allows the student to incorporate into Academia, Industry or the teaching sector, or to incorporate in a post-doctoral position in or out of Croatia. It also gives the student the tools necessary to keep on going through his/her long-life learning process.</p>
Do the competences acquired upon finishing the study programme guarantee employability and continuation of study?	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<p>Explanation:</p> <p>As stated above, PhD degree is the highest level that can be achieved in education. However, the skills and competences acquired allow the student to continue his long-life learning process in any possible job position or post-doctoral stay he/she decides to accomplish. The general learning outcomes listed in the proposal (Section 2.2) provides the student with autonomy, critical thinking, initiative and connection with the social and economic needs.</p>
Is the study programme well designed as a whole and does it correspond to the modern scientific knowledge?	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<p>Explanation</p> <p>The program is coherent, the subjects offered are appropriate and the organisation is similar to other PhD programs in Croatia and in the EU. The description of the structure (section 2.6) and the process and different steps through which the student must go through until completion of his/her studies is well described. Initial admission is also described.</p> <p>Suggestions/questions. 1) I cannot see how many placements are offered per year. 2) It seems that only one mentor/supervisor/director is possible for each student. Co-</p>

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	<p>directions seem not possible, not in Croatia neither with an international partner. Is it described in the Ordinance on Postgraduate University (Doctoral) Study that is mentioned in the document? 3) I already mentioned that a maximum of 6 years for the full-time students seems to be too long but I can see that the duration is defined in the Ordinance on Postgraduate University (Doctoral) study. 4) How and when the student enrolls as part-time student? What are the requisites needed to enrol as part-time student? Who approves this? 5) In the last table of section 2.11 (Final requirement for completion of study) the box "doctoral exam" is marked along with "doctoral dissertation". Is this a different exam or does it refer to the doctoral dissertation? 6) In section 3.5 the estimated cost for tuition fees is in HRK; since Croatia joined Euro in January 1, 2023 it should be updated to €.</p>
Are the teaching methods (types of instruction) well designed and appropriate for the study programme?	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<p>Explanation: The teaching is based in lectures, independent assignments and work with mentor. Depending on the subject other additional tools/format are used: e-learning, essays, multimedia.</p> <p>Comments: The grading system is specified in almost all subjects, but some are missing: - Code: DSI10 "Cement composites of desired properties" - Code: DSI02 "ionic liquids"</p>
Do the anticipated student obligations enable the achievement of the set learning outcomes?	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<p>Explanation: Regarding the courses, the compulsory courses include in their obligations independent assignments and essays, that will help the student with learning outcomes No. 3, 4 and 9. Each elective course also help in different learning outcomes more related with the specific subject, but also with general ones No. 3, 4 and 9. Publishing of one WoS paper and participation and presentation in scientific meetings aim to learning outcomes 1, 2, 3, 5, 6, 7 and 9. The research project itself and the preparation of the doctoral dissertation will help them to gain skills in critical thinking, self-organization and autonomous work, communication skills, and also to think about how their work will contribute to society (learning outcome 10). Ethics is present in all activities.</p>
Does the number of ECTS points assigned to individual courses correspond to the volume of subject material and the assigned hours of instruction? State the courses for which it does not.	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<p>Explanation: Even though the organization of each course is different, the breakdown in allocated ECTS for the different activities covers the required 5 ECTS points stated in the proposal.</p>
Are the courses/modules interconnected, i.e. is there a logical connection between prerequisites and the sequence of courses?	
<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<p>Explanation: There is no need for that. The number of courses to be taken is small: two compulsory courses on general aspects of scientific methodology, statistics and chemometrics, and two elective courses of their choice. None of them have any pre-requisites. Also, beyond the fact that there is two compulsory courses that should be taken in first place, there is no need of interconnection between the other courses. In fact, a student on the Chemical Engineering side should be able to take courses on the Chemistry side if he/she feels is good for his/her career or research project. This "freedom" is in good agreement with the inter-disciplinary character of the programme and with an advanced research level as well, as it should be in a doctoral programme.</p>

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State possible remarks regarding the description of an individual course (learning outcomes, contents, literature...)

Explanation:

Course code: DSI10 "Cement composites of desired properties"

Comments: 1) In the format of instruction the box e-learning is marked; however, the box "Percentage of application of e-learning is empty; 2) the box about the grading and evaluating system is empty.

Course code: DSI01 "Ecologically friendly methods of organic synthesis"

Comments: Optional literature box is empty; I think that recent review scientific papers is OK but not necessarily enough. Some basic literature should be suggested in case the student wants to get a general and solid background in the subject.

Course code: DSI18 "Application of natural sorbents in environmental remediation"

Comments: Optional literature box is empty; I think that recent review scientific papers is OK but not necessarily enough. Some basic literature on environmental remediation should be suggested in case the student wants to get a general and solid background in the subject.

Course code: DSI09 "Influence of phenylboronic acid on efficiency of biological active compounds"

Comments: 1) In the format of instruction the box e-learning is marked; however, the box "Percentage of application of e-learning is empty; 2) Optional literature box is empty and only recent scientific papers are suggested as literature; even though the topic is very specific, could it be possible to suggest some basic literature on boronic acids in relation with their application in medicinal chemistry?

Course code: DSI02 "Ionic liquids"

Comments: 1) In the format of instruction the box e-learning is marked; however, the box "Percentage of application of e-learning is empty; 2) the box about the grading and evaluating system is empty.

Course code: DSI12 "Kinetic analysis of thermally activated processes in polymeric materials"

Comments: 1) In the format of instruction the box e-learning is marked; however, the box "Percentage of application of e-learning is empty.

Course code: DSI19 "Trends in development of polymer blends and composites"

Comments: 1) Optional literature box is empty and only recent scientific papers are suggested as literature; I think it should be good is some basic literature on the subject could be detailed; 2) In the format of instruction the box "field work" is marked; however, I cannot find anything related to it in the course content description or in the screening student work; can the proponents modify the worksheet to make it coherent?

State possible remarks regarding the competences of teachers on individual courses.

Nothing to comment. According to the introduction, all the staff has experience on the previous PhD programmes in Chemistry and in Chemical Engineering. In the info provided in each work-sheet for every teacher the competences are in good agreement with the subject taught. Moreover, re-accreditation gave high marks on several areas where teachers and mentors where specifically mentioned.

4. STUDY PROGRAMME CONDITIONS PERTAINING TO VENUE AND STAFF


Does the proposed teaching and scientific staff possess the necessary competences for running the study programme?

☒ YES ☐ NO

Explanation:

As it was stated above, the info provided in each work-sheet for every teacher shows that the competences are in good agreement with the subject taught. Moreover, re-accreditation gave high marks on several areas where teachers and mentors where specifically mentioned. Section 1.9 of the proposal also shows that FCT has a long experience in running both programmes separately until now. It is presumed that the

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	teaching staff involved in the previous programmes is going to be the same involved in this new merged one.
Are the technical and material conditions for running the study programme satisfactory?	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Explanation: I have been able to visit FCT twice during the last two years. The building is new and have state of the art facilities. The new scientific equipment for research and teaching has been purchased and installed thanks to external European funding obtained by FCT. The equipment is state of the art and its characteristics pertaining their capabilities for research are adequate to the objectives proposed for the programme. Students using it will acquire the necessary skills in modern methodologies and techniques necessary to apply in the labour market.
With regards to the staff, venue and equipment, is the number of students adequate?	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Explanation: The number of teachers involved in the programme is 28, which also have labs assigned for their research. A total admission quota of 10-15 per year means that over three years there will be around 45 PhD students on different stages of their PhD thesis. I think that this numbers are adequate for the capacity of the building in terms of number of research labs, number of staff and the equipment.

5. FINAL RECOMMENDATION	
<input checked="" type="checkbox"/>	Accept the proposed study programme
<input type="checkbox"/>	Accept the proposed study programme with minor alterations
Requested minor alterations:	
<input type="checkbox"/>	Accept the proposed study programme with major alterations
Requested major alterations:	
<input type="checkbox"/>	Reject the proposed study programme
Further explanation:	

REVIEWER	
Name and surname	Juan Carlos García Galindo
Institution	University of Cadiz
Place	Cadiz, Spain
Date	January 24, 2023
Signature	 Dr. Juan Carlos García Galindo