



# The External Evaluation Report of the Chemistry Doctoral Study Domain ACADEMIA ROMANA

Preliminary report by  
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## **I. Introduction<sup>1</sup>**

### **II.1 The evaluation**

The report includes the findings and conclusions obtained by the International Expert during the online evaluation of the Chemistry Domain in the PhD school at Academia Romana. The online meetings took place between October 25<sup>th</sup> and November 5<sup>th</sup>, with detailed schedule shown in **VII.1. Annex: Detailed schedule of the visit.**

The expert's committee was composed by

- Professor Ioan Mămăligă – PhD supervisor at the Doctoral School of the “Gheorghe Asachi” Technical University of Iași and member of the Permanent Commission for Engineering Sciences 2 of ARACIS;
- Ms. Bianca Cernușcă, PhD student in Chemistry at the West University of Timișoara; and
- Professor Jordi Villà Freixa – Universitat de Vic – Universitat Central de Catalunya, Spain;

### **II.1 The Chemistry domain**

The field CHEMISTRY is developed in the four specialized research institutes subordinated to the Romanian Academy:

- **“Petru Poni” Institute of Molecular Chemistry (ICMPP):**
  - o investigations of biomaterials (systems of controlled release of medicines, nonviral vectors for nucleic acid transport, hydrogels for tissue engineering), of electro-and optoactive (micro, nano)

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<sup>1</sup> Each time when applicable the information shall be presented gender-wise.



materials for micro/nanoelectronics and energy industry (composites, organic-inorganic hybrids, semiconducting polyrotaxanes), of environment protection materials or for complex valorization of vegetal biomass

- Education at the PhD level:
  - an average of 4 doctoral theses defended yearly
  - PhD supervisors affiliated with SCOSAAR: 15

- **“Ilie Murgulescu” Institute of Physical Chemistry (ICF):**

- researches in all the fields of physical-chemistry (molecular structure, thermodynamics, kinetics, electrochemistry, catalysis, materials science, surface science, oxidic materials, composites and hybrids with catalytic and photocatalytic, electrocatalytic and photoelectrocatalytic properties for applications in environment decontamination, chemical syntheses or making fuel cells
- Education at the PhD level:
  - 18 doctoral students who defended their thesis in the last 5 years published 29 ISI papers which have already accumulated over 250 WoS citations

- **“Coriolan Drăgulescu” Institute of Chemistry (ICT):**

- researches in
  - computer assisted molecular designing: chemometrics, quantum-chemical methods, molecular modeling, modeling of the interaction receiver –selective modulating ligands with relevance in the treatment of certain types of neoplasms, GPCR– G proteins receptors; translational study of medicines and medicine identification; identification of natural compounds for therapeutic purposes;
  - organic-inorganic networks based on phosphinic acids and luminescent phosphin imides;
  - polymers containing pendant groups containing phosphorus or/and nitrogen having relevance in water treatment; polymers and vinyl copolymers obtained by means of photoinitiation;
  - chemistry of terpylori compounds with relevance in biological systems, technical and analytical (analytical sensors);
  - chemistry of coordination compounds with special properties (optical, magnetic, mesogen, catalytic in homogenous and heterogeneous environment) with guided activity, biological (models of biological systems, relevant in imaging, medicines), materials for environment protection, sensors;
  - chemistry of nanostructured materials (silica based nanocomposites, organic-inorganic hybrids, polyaniline-based composites).
- Education at the PhD level:
  - an average of 2 doctoral theses defended yearly
  - PhD supervisors affiliated with SCOSAAR: 2

- **“Costin D. Nenițescu” Centre of Organic Chemistry (CCO):**



- Research: The fields of expertise of the Centre include both organic chemistry fine synthesis and the development of technologies for the heavy chemical industry.
- Education at the PhD level: CCO did not have students in the evaluated period.

## **II. Methods used**

The evaluation panel for the Chemistry domain collectively participated in all online meetings organized by the commission at the Academia Romana. As for the international expert, due to teaching commitments, he had less opportunities to interact with the different teams at the academia romana, and the conclusions in this report come from the reading of the documentation provided both in the self evaluation report (SER) and in individual contacts with the rest of the team and the coordinators of the evaluation at ARACIS and the Academia Romana.

Thus, this report is essentially ground in the information provided in the SER, which is concise but complete with respect to the needed evaluation.

As stated in Section **VII.1. Annex: Detailed schedule of the visit**, the meetings were organized by the commission with the several stakeholders of the chemistry doctoral study domain:

1. Doctoral students,
2. Graduates,
3. School officials,
4. Doctoral advisors,
5. Employers and centers,
6. Representatives of the Doctoral School, the Quality Assessment and Assurance Commission, the Quality Department and the Ethics Commission.

## **III. Analysis of ARACIS's performance indicators**

### **Domain A. INSTITUTIONAL CAPACITY**

#### **Criterion A.1. The administrative, managerial institutional structures and the financial resources**

*Standard A.1.1. The institution organizing doctoral studies (IOSUD) has implemented the effective functioning mechanisms provided for in the specific legislation on the organization of doctoral studies.*

**Performance Indicator A.1.1.1.** *The existence of specific regulations and their application at the level of the Doctoral School of the respective university doctoral study domain:*

- (a) the internal regulations of the Doctoral School;*
- (b) the Methodology for conducting elections for the position of director of the Council of doctoral school (CSD), as well as elections by the students of their representative in CSD and the evidence of their conduct;*
- (c) the Methodologies for organizing and conducting doctoral studies (for the admission of doctoral students, for the completion of doctoral studies);*



- d) the existence of mechanisms for recognizing the status of a Doctoral advisor and the equivalence of the doctoral degree obtained abroad;
- e) functional management structures (Council of the doctoral school), giving as well proof of the regularity of meetings;
- f) the contract for doctoral studies;
- g) internal procedures for the analysis and approval of proposals regarding the training for doctoral study programs based on advanced academic studies.
  - description of the facts, the findings from the assessed institution's documents and the evaluation visit itself
  - analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself

### **Description**

The specific regulations of CSUD and the Doctoral School exist and are applied within IOSUD.

- a) doctoral school regulations<sup>2</sup>
- b) the methodology of conducting the elections
- c) methodologies for organizing and conducting doctoral studies<sup>3</sup>.
- d) the existence of mechanisms for the recognition of the quality of doctoral supervisor and of the equivalence of the doctorate obtained in other states
- e) functional management structures<sup>4</sup>
- f) the doctoral university contract;
- g) internal procedures for analysis and approval of proposals on the subject based on advanced university studies.

### **Analysis**

Based in the facts and after the online meetings and the reading of the documentation, it was made clear that the Chemistry Domain and the doctoral school works within the proper regulatory framework.

### **Recommendations**

The indicator is fulfilled

**Performance Indicator A.1.1.2.** *The doctoral school' Regulation includes mandatory criteria, procedures and standards binding on the aspects specified in Article 17, paragraph (5) of the Government Decision No. 681/2011 on the approval of the Code of Doctoral Studies with subsequent amendments and additions.*

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<sup>2</sup> <https://acad.ro/scosaar/doc2013/doc2013-0910Regulament.pdf>

<sup>3</sup> <https://acad.ro/scosaar/admitere.html>

<sup>4</sup> <https://acad.ro/scosaar/structura-en.html>



### **Description**

The regulations of the doctoral school include criteria, procedures and mandatory standards for the aspects specified in art. 17 para. (5) of the Code of doctoral studies, approved by Government Decision no. 681/2011, with subsequent amendments and completions.<sup>5</sup>

Details and links to these regulations are presented in Annex 4 of the provided documentation.

### **Analysis**

The regulatory framework is clear and the university complies with the requirements

### **Recommendations**

The indicator is fulfilled

**Standard A.1.2.** *The IOSUD has the logistical resources necessary to carry out the doctoral studies' mission.*

**Performance Indicator A.1.2.1.** *The existence and effectiveness of an appropriate IT system to keep track of doctoral students and their academic background.*

### **Description**

Within the Doctoral School, the record of doctoral students is made through its own computer system which consists of a database and through the Unique Matriculation Register (RMU).

### **Analysis**

The requirements based on the Ministry Order for Doctoral Studies are accomplished in terms of the IT system.

### **Recommendations**

The indicator is fulfilled

**Performance Indicator A.1.2.2.** *The existence and use of an appropriate software program and evidence of its use to verify the percentage of similarity in all doctoral theses.*

### **Description**

The computer platform sistemantiplagiat.ro is used and is adequate to verify the percentage of similarity for the doctoral thesis. The platform used by SCOSAAR to

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<sup>5</sup> <https://acad.ro/scosaar/doc2013/doc2013-0910Regulament.pdf>



verify the degree of similarity in the case of doctoral theses is mentioned as being recognized by CNATDCU in Order no. 5,229 of 17 August 2020 (for the approval of the methodologies regarding the granting of the accreditation certificate, the granting of the doctoral title, as well as the settlement of complaints regarding non-compliance with quality or professional ethics standards, including the existence of plagiarism, in a thesis doctorate).

### **Analysis**

The antiplagiarism tools are in place and are used effectively.

### **Recommendations**

The indicator is fulfilled

**Standard A.1.3.** *The IOSUD makes sure that financial resources are used optimally, and the revenues obtained from doctoral studies are supplemented through additional funding besides governmental funding.*

**Performance Indicator A.1.3.1.** *Existence of at least one research or institutional / human resources development grant under implementation at the time of submission of the internal evaluation file, per doctoral study domain under evaluation, or existence of at least 2 research or institutional development / human resources grant for the doctoral study domain, obtained by doctoral thesis advisors operating in the evaluated domain within the past 5 years. The grants address relevant themes for the respective domain and, as a rule, are engaging doctoral students.*

### **Description**

Total grants 2016-2020 CHEMISTRY field of doctoral supervisors: 88. The research contracts are presented in Annex 4.1 of the SER.

### **Analysis**

The competitiveness of the Domain supervisors is clear and they are active searching for and finding external sources of funding to support their research and the research of their PhD students.

### **Recommendations**

The indicator is fulfilled

**Performance Indicator \*A.1.3.2.** *The percentage of doctoral students active at the time of the evaluation, who for at least six months receive additional funding sources besides government funding, through scholarships awarded by individual persons or by legal entities, or who are financially supported through research or institutional / human resources development grants is not less than 20%.*



## Description

The number of PhD students in the internship during 2016-2020 was 120.

41 PhD students benefited from other sources of funding than government funding in the evaluated period (2016-2020) (research or institutional development / human resources grants). The proportion is 34.16%.

PhD students who have benefited from other sources of funding are listed in Annex 4.2

## Analysis

The proportion of students that are beneficiary of funding sources other than government funding is clearly higher than 20%.

## Recommendations

The indicator is fulfilled.

**Performance Indicator \*A.1.3.3.6** *At least 10% of the total amount of doctoral grants obtained by the university through institutional contracts and of tuition fees collected from the doctoral students enrolled in the paid tuition system is used to reimburse professional training expenses of doctoral students (attending conferences, summer schools, training, programs abroad, publication of specialty papers or other specific forms of dissemination etc.).*

## Description

Romanian Academy - SCOSAAR has not concluded an institutional contract for doctoral grants and does not collect tuition fees for the field of Chemistry

## Analysis

The indicator does not apply

## Recommendations

The indicator does not apply

### **Criterion A.2. Research infrastructure**

<sup>6</sup> The indicators marked with an asterisk (\*) hold a special status, referring exclusively to the evaluation of doctoral studies domains, as per Article 12 from the annex No.1 of the Order of the minister of education No. 3651/12.04.2021 approving the Methodology for evaluating university doctoral studies and the system of criteria, standards and performance indicators used in the evaluation. In case they are not met, the Agency extends a period of maximum 3 years to IOSUD to correct the respective deficiencies.





**Standard A.2.1.** *The IOSUD has a modern research infrastructure to support the conduct of doctoral studies' specific activities.*

**Performance Indicator A.2.1.1.** *The venues and the material equipment available to the doctoral school enable the research activities in the evaluated domain to be carried out, in line with the assumed mission and objectives (computers, specific software, equipment, laboratory equipment, library, access to international databases etc.). The research infrastructure and the provision of research services are presented to the public through a specific platform. The research infrastructure described above, which was purchased and developed within the past 5 years will be presented distinctly.*

### **Description**

The CHEMISTRY domain has laboratories and data processing spaces equipped with apparatus, laboratory equipment, computers, software, library, access to international databases, library, internet, etc., with most of which publicly presented on the profile platform (ERRIS).

Details with equipment purchased in the last 5 years can be found in Annex 4.3

### **Analysis**

The field of doctoral studies in Chemistry has at its disposal infrastructure that guarantees the correct implementation of the domain studies.

### **Recommendations**

The indicator is fulfilled.

## **Criterion A.3. Quality of Human Resources**

**Standard A.3.1.** *At the level of each domain there are sufficient qualified staff to ensure the conduct of doctoral study program.*

**Performance Indicator A.3.1.1.** *Minimum three doctoral thesis advisors within that doctoral domain, and at least 50% of them (but no less than three) meet the minimum standards of the National Council for Attestation of University Degrees, Diplomas and Certificates (CNATDCU) in force at the time when the evaluation is carried out, which standards are required and mandatory for obtaining the enabling certification.*

### **Description**

28 doctoral supervisors work within the doctoral field of chemistry. The percentage of fulfillment by the doctoral supervisors of the CNATDCU standards in force at the moment of carrying out the evaluation, necessary and obligatory for obtaining the habilitation certificate is of 82.14%.



Details are provided in Annex 4.4 of the SER.

### **Analysis**

The number of doctoral supervisors who have activity in the field of Chemistry and meet the minimum standards of the National Council for Attesting the Academic Titles, Diplomas and Certifications (CNATDCU) in force at the time of the evaluation is, by large, achieved.

### **Recommendations**

The indicator is fulfilled

**Performance Indicator \*A.3.1.2.** *At least 50% of all doctoral advisors have a full-time employment contract for an indefinite period with the IOSUD.*

### **Description**

25 of the 28 doctoral supervisors work in the doctoral field of chemistry with an employment contract for an indefinite period, which represents a percentage of 89.28%. Details are provided in Annex 4.5 of the SER.

### **Analysis**

Clear fulfilment

### **Recommendations**

The indicator is fulfilled.

**Performance Indicator A.3.1.3.** *The study subjects in the education program based on advanced higher education studies pertaining to the doctoral domain are taught by teaching staff or researchers who are doctoral thesis advisors / certified doctoral thesis advisors, professors / CS I or lecturer / CS II, with proved expertise in the field of the study subjects they teach, or other specialists in the field who meet the standards established by the institution in relation with the aforementioned teaching and research functions, as provided by the law.*

### **Description**

All disciplines in the training program based on advanced doctoral studies within the 2016-2020 period in ICMPP were supported by teachers or researchers who have the quality of doctoral supervisor / qualified, professor / CS I or CS II, with proven expertise in the field of disciplines taught, according to Annex 4.6 of the SER.



## Analysis

The indicator is clearly fulfilled.

## Recommendations

The indicator is fulfilled.

**Performance Indicator \*A.3.1.4.** *The percentage of doctoral thesis advisors who concomitantly coordinate more than 8 doctoral students, but no more than 12, who are themselves studying in doctoral programs<sup>7</sup> does not exceed 20%.*

## Description

A doctoral supervisor had 9 PhD students at a time for a short period of time. The other 27 PhD supervisors did not have more than 8 PhD students at the same time. The share is, thus, 3.57% (1 leader out of 28).

The list of PhD supervisors and PhD students in internship in the period 2016-2020 is presented in Annex 4.7 of the SER.

## Analysis

The indicator is largely fulfilled

## Recommendations

The indicator is fulfilled.

**Standard A.3.2.** *The Doctoral advisors within the domain are carrying out a scientific activity visible at international level.*

**Performance Indicator A.3.2.1.** *At least 50% of the doctoral thesis advisors in the evaluated domain have at least 5 Web of Science- or ERIH-indexed publications in magazines of impact, or other achievements of relevant significance for that domain, including international-level contributions that indicate progress in scientific research - development - innovation for the evaluated domain. The aforementioned doctoral thesis advisors enjoy international awareness within the past five years, consisting of: membership on scientific boards of international publications and conferences; membership on boards of international professional associations; guests in conferences or expert groups working abroad, or membership on doctoral defense commissions at universities abroad or co-leading with universities abroad. For Arts*

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<sup>7</sup> 3 years for the doctoral university studies with the duration stipulated at Article 159, paragraph (3), respectively 4 years for the doctoral university studies with the duration stipulated at Article 174, paragraph (3) of the Law of national education No.1/2011 with subsequent amendments and additions, with additional extension periods approved as per Article 39, paragraph (3) of the Code of doctoral studies approved by the GD No. 681/2011 with subsequent amendments and additions.



and Sports and Physical Education Sciences, doctoral thesis advisors shall prove their international visibility within the past five years by their membership on the boards of professional associations, membership in organizing committees of arts events and international competitions, membership on juries or umpire teams in artistic events or international competitions.

### **Description**

100% of CHEMISTRY PhD supervisors present at least 5 Web of Science indexed publications or have other achievements with relevant significance for the chemistry field, as detailed in Annex 4.8 of the SER.

### **Analysis**

Doctoral supervisors have publications indexed in the Web of Science, with impact factor relevant to the field of chemistry.

### **Recommendations**

The indicator is fulfilled.

**Performance Indicator \*A.3.2.2.** *At least 50% of the doctoral thesis advisors in a specific doctoral study domain continue to be active in their scientific field, and acquire at least 25% of the score requested by the minimal CNATDCU standards in force at the time of the evaluation, which are required and mandatory for acquiring their enabling certificate, based on their scientific results within the past five years.*

### **Description**

According to the information provided in the SER (Annex 4.9), 82.14% (23/28) of the doctoral supervisors assigned to the chemistry field continue to be scientifically active, obtaining, for the period 2016-2020, at least 25% of the score required by the minimum CNATDCU standards in force at the date of evaluation, necessary and mandatory

### **Analysis**

The group of doctoral supervisors are clearly active in research.

### **Recommendations**

The indicator is fulfilled.

## **Domain B. EDUCATIONAL EFFECTIVENESS**

**Criterion B.1. The number, quality and diversity of candidates enrolled for the admission contest**



**Standard B.1.1.** *The institution organizing doctoral studies has the capacity to attract candidates from outside the higher education institution or a number of candidates exceeding the number of seats available.*

**Performance Indicator \*B.1.1.1.** *The ratio between the number of graduates of masters' programs of other higher education institutions, national or foreign, who have enrolled for the doctoral admission contest within the past five years and the number of seats funded by the state budget, put out through contest within the doctoral domain is at least 0.2 or the ratio between the number of candidates within the past five years and the number of seats funded by the state budget put out through contest within the doctoral studies domain is at least 1,2.*

### **Description**

According to the regulations in force and in accordance with the specifics of their object of activity (fundamental and advanced research), the institutes and centers of the AR do not organize master studies. In this context, all candidates for the competition for admission to doctoral studies within SCOSAAR, come from other higher education institutions in the country and abroad.

### **Analysis**

As MSc studies are not conducted in Academia Romana, all PhD students come from other institutions, so the ratio established in this indicator is, indeed, 100%

### **Recommendations**

The indicator does not apply

**Standard B.1.2** *Candidates admitted to doctoral studies demonstrate academic, research and professional performance.*

**Performance Indicator \*B.1.2.1.** *Admission to doctoral study programs is based on selection criteria including: previous academic, research and professional performance, their interest for scientific or arts/sports research, publications in the domain and a proposal for a research subject. Interviewing the candidate is compulsory, as part of the admission procedure.*

### **Description**

The Doctoral school regulations,<sup>8</sup> as well as the methodologies for organizing and conducting doctoral studies<sup>9</sup> include detailed description of the procedures for PhD admission, including the interview to the candidate.

### **Analysis**

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<sup>8</sup> <https://acad.ro/scosaar/doc2013/doc2013-0910Regulament.pdf>

<sup>9</sup> <https://acad.ro/scosaar/admitere.html>



The admission process fulfills the expected procedures in agreement with the regulations.

### **Recommendations**

The indicator is fulfilled.

**Performance Indicator B.1.2.2.** *The expelling rate, including renouncement / dropping out of doctoral students 3, respectively 4, years after admission<sup>10</sup> does not exceed 30%.*

### **Description**

In the period 2016-2020 there were 120 PhD students in internship, of which 5 were expelled and 5 withdrew after 3 years from admission. Thus, the expulsion and withdrawal rate was 8.33%. Details in Annex 4.7 of the SER.

### **Analysis**

The expulsion and withdrawal rates are low, which implies success of the PhD program objectives.

### **Recommendations**

The indicator is fulfilled.

### **Criterion B.2. The content of doctoral programs**

**Standard B.2.1.** *The training program based on advanced university studies is appropriate to improve doctoral students' research skills and to strengthen ethical behavior in science.*

**Performance Indicator B.2.1.1.** *The training program based on advanced academic studies includes at least 3 disciplines relevant to the scientific research training of doctoral students; at least one of these disciplines is intended to study in-depth the research methodology and/or the statistical data processing.*

### **Description**

The training plan includes disciplines specific to the field of chemistry: Details in Annex 4.6 and in Forms I of each doctoral student. Section **VII.2. Annex: Educational plans at the different centers** in this document provides the information in English of the programs of 3 of the 4 institutes.

### **Analysis**

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<sup>10</sup> 3 years for the doctoral university studies with the duration stipulated at Article 159, paragraph (3), respectively 4 years for the doctoral university studies with the duration stipulated at Article 174, paragraph (3) of the Law of national education No. 1/2011 with subsequent amendments and additions.



It appears clear that the PhD programs in the 3 institutes that had students in the evaluation period follow the expected structure and contents.

### **Recommendations**

The indicator is fulfilled.

**Performance Indicator B.2.1.2.** *At least one discipline is dedicated to Ethics and Intellectual Property in scientific research or there are well-defined topics on these subjects within a discipline taught in the doctoral program.*

### **Description**

The curriculum in the different institutes plan includes the discipline Ethics and academic integrity. Details are given in Annex 4.6 of the SER and in **VII.2. Annex: Educational plans at the different centers** of this document.

### **Analysis**

Ethical aspects as well as intellectual property topics are included in the curricula of the different institutes.

### **Recommendations**

The indicator is fulfilled.

**Performance Indicator B.2.1.3.** *The IOSUD has mechanisms to ensure that the academic training program based on advanced university studies addresses „the learning outcomes”, specifying the knowledge, skills, responsibility and autonomy that doctoral students should acquire after completing each discipline or through the research activities<sup>11</sup>.*

### **Description**

As stated in the SER, the curriculum for the training program based on advanced university studies includes scientific activity aimed at acquiring and applying learning outcomes, as well as the preparation of the Scientific Research Project and the two Research Reports, all under the guidance of the scientific leader and the research team guidance. Details in Annex 4.6 and Annex 4.10, as well as in **VII.2. Annex: Educational plans at the different centers** of this document

### **Analysis**

<sup>11</sup> Or by what the graduate should know, understand and to be able to do, according to the provisions of the Methodology of 17 March 2017 regarding inscription and registration of higher education qualifications in the National Register of Qualifications in Higher Education (RNCIS) approved by the Order No.3475/2017 with subsequent amendments and additions.



Training in the PhD program includes balanced material to ensure the proper formation of the PhD students in terms of *knowledge, skills, responsibility and autonomy*.

### **Recommendations**

The indicator is fulfilled.

**Performance Indicator B.2.1.4.** *All along the duration of the doctoral training, doctoral students in the domain receive counselling/guidance from functional guidance commissions, which is reflected in written guidance and feedback or regular meeting.*

### **Description**

According to the information provided in the SER, for the entire duration of the doctoral training internship, the doctoral students in the field benefit from the counseling and guidance of some functional guidance commissions, aspect reflected by scientific papers published in co-authorship. Details can be found in Annex 4.6 and Annex 4.10 of the SER.

### **Analysis**

Counseling and guidance is a major concern of the PhD program, as learnt from the SER and also from the interviews.

### **Recommendations**

The indicator is fulfilled

**Performance Indicator B.2.1.5.** *For a doctoral study domain, the ratio between the number of doctoral students and the number of teaching staff/researchers providing doctoral guidance must not exceed 3:1.*

### **Description**

Number of doctoral students with a guidance committee: 75 Total number of teachers / researchers providing guidance: 128 Ratio:  $75/128 = 0.58: 1$  Details in Annex 4.10

### **Analysis**

There is a large number of researchers in tasks of supervising and advising PhD students, which guarantees a healthy training environment for the students.

### **Recommendations**

The indicator is fulfilled.





### **Criterion B.3. The results of doctoral studies and procedures for their evaluation.**

**Standard B.3.1.** *Doctoral students capitalize on the research through presentations at scientific conferences, scientific publications, technological transfer, patents, products and service orders.*

*\*general description of the standard analysis.*

**Performance Indicator B.3.1.1.** *For the evaluated domain, the evaluation commission will be provided with at least one paper or some other relevant contribution per doctoral student who has obtained a doctor's title within the past 5 years. From this list, the members of the evaluation commission shall randomly select 5 such papers / relevant contributions per doctoral study domain for review. At least 3 selected papers must contain significant original contributions in the respective domain.*

#### **Description**

According to the information provided in the SER, the number of PhD students who have obtained the title of doctor in the last 5 years is 47. These students have produced, within such period, 300 articles published. Details are given in Annex 4.11 of the SER.

#### **Analysis**

Performance of the students within the program is outstanding, implying a high level of the whole program with respect to other universities and centers within the Romanian system.

#### **Recommendations**

The indicator is fulfilled.

**Performance Indicator \*B.3.1.2.** *The ratio between the number of presentations of doctoral students who completed their doctoral studies within the evaluated period (past 5 years), including posters, exhibitions made at prestigious international events (organized in the country or abroad) and the number of doctoral students who have completed their doctoral studies within the evaluated period (past 5 years) is at least 1.*

#### **Description**

The ratio between the number of presentations of doctoral students who completed their doctoral studies in the evaluated period (last 5 years), including poster-type exhibitions, exhibitions, held at prestigious international events (held in the country or abroad) (331) and the number of doctoral students who have completed their doctoral studies in the evaluated period (last five years) (47) is 7.04, and is higher than 1. Details in Annex 4.12

#### **Analysis**



As occurred with the previous indicator, the outstanding productivity of PhD students is remarkable.

### **Recommendations**

The indicator is fulfilled.

*Standard B.3.2. The Doctoral School engages a significant number of external scientific specialists in the commissions for public defense of doctoral theses in the analyzed domain.*

*\*general description of the standard analysis.*

**Performance Indicator \*B.3.2.1.** *The number of doctoral theses allocated to one specialist coming from a higher education institution, other than the evaluated IOSUD should not exceed two (2) in a year for the theses coordinated by the same doctoral thesis advisor.*

### **Description**

The number of doctoral theses assigned to a certain supervisor coming from a higher education institution, other than IOSUD evaluated, with one exception, does not exceed two for the theses coordinated by the same doctoral supervisor in a year, even for cases in which there is important participation of such supervisors (Prof. Geta David, Prof. Dr. Adelina Ianculescu, Prof. Dr. Francisc Peter., Prof. Dr. Nicolae Vaszilcsin, or Conf. Dr. Dana Vlascici, to name the most prominent examples). Details are given in Annex 4.13 of the SER.

### **Analysis**

There exist a good balance between openness and inclusion of researchers in other centers and institutions and researchers of Academia Romana in the decision on PhD supervisions.

### **Recommendations**

The indicator is fulfilled.

**Performance Indicator \*B.3.2.2.** *The ratio between the doctoral theses allocated to one scientific specialist coming from a higher education institution, other than the institution where the defense on the doctoral thesis is organized, and the number of doctoral theses presented in the same doctoral study domain in the doctoral school should not exceed 0.3, considering the past five years. Only those doctoral study domains in which minimum ten doctoral theses have been presented within the past five years should be analyzed.*

### **Description**

The ratio between the number of doctoral theses assigned to a certain scientific referent from another higher education institution (maximum of 5, according to the



data in Annex 4.14 of the SER) and the number of doctoral theses defended in the same field of doctoral studies within the doctoral school (47) is less than 10%.

### **Analysis**

The variety of panel members is large and not problematic at all, showing good health in the PhD studies.

### **Recommendations**

The indicator is fulfilled

## **Domain C. QUALITY MANAGEMENT**

### **Criterion C.1. Existence and periodic implementation of the internal quality assurance system**

**Standard C.1.1.** *There are an institutional framework and procedures in place and relevant internal quality assurance policies, applied for monitoring the internal quality assurance.*

*\*general description of the standard analysis.*

**Performance Indicator C.1.1.1.** *The Doctoral school in the respective university study domain shall demonstrate the continuous development of the evaluation process and its internal quality assurance following a procedure developed and applied at the level of the IOSUD, the following assessed criteria being mandatory:*

- (a) the scientific work of Doctoral advisors;*
- (b) the infrastructure and logistics necessary to carry out the research activity;*
- (c) the procedures and subsequent rules based on which doctoral studies are organized;*
- d) the scientific activity of doctoral students;*
- e) the training program based on advanced academic studies of doctoral students;*
- f) social and academic services (including for participation at different events, publishing papers etc.) and counselling made available to doctoral students.*

### **Description**

Its evaluation and internal quality assurance are constantly carried out in accordance with the procedure developed and applied at IOSUD level.

The international expert just had access to the information in the SER with respect to this item, so no further material can be incorporated. However, the quality system is in place.

### **Analysis**

From the information obtained, the quality system is in place.

### **Recommendations**



The indicator is fulfilled.

**Performance Indicator \*C.1.1.2.** *Mechanisms are implemented during the stage of the doctoral study program to enable feedback from doctoral students allowing to identify their needs, as well as their overall level of satisfaction with the doctoral study program in order to ensure continuous improvement of the academic and administrative processes. Following the analysis of the results, there is evidence that an action plan was drafted and implemented.*

### **Description**

The level of satisfaction with the doctoral program of doctoral students was constantly monitored, through the tutorial activity carried out by the doctoral supervisors and through the guidance commissions.

### **Analysis**

The mechanisms to assess the satisfaction of the students is in place, and no special concerns were detected in this regard from the interviews.

### **Recommendations**

The indicator is fulfilled

## **Criterion C.2. Transparency of information and accessibility of learning resources**

**Standard C.2.1.** *Information of interest to doctoral students, future candidates and public interest information is available for electronic format consultation.*

**Performance Indicator C.2.1.1.** *The IOSUD publishes on the website of the organizing institution, in compliance with the general regulations on data protection, information such as:*

- (a) the Doctoral School regulation;*
- (b) the admission regulation;*
- (c) the doctoral studies contract;*
- (d) the study completion regulation including the procedure for the public presentation of the thesis;*
- (e) the content of training program based on advanced academic studies;*
- (f) the academic and scientific profile, thematic areas/research themes of the Doctoral advisors within the domain, as well as their institutional contact data;*
- (g) the list of doctoral students within the domain with necessary information (year of registration; advisor);*
- (h) information on the standards for developing the doctoral thesis;*
- (i) links to the doctoral theses' summaries to be publicly presented and the date, time, place where they will be presented; this information will be communicated at least twenty days before the presentation.*

### **Description**



The SCOSAAR website and of the institutes affiliated to the CHEMISTRY field publish on the necessary information on their websites, in compliance with the regulations in force regarding the data protection.

### **Analysis**

The web pages concerning the PhD program seem well developed and informative.

### **Recommendations**

The indicator is fulfilled

**Standard C.2.2.** *The IOSUD/The Doctoral School provides doctoral students with access to the resources needed for conducting doctoral studies.*

**Performance Indicator C.2.2.1.** *All doctoral students have free access to one platform providing academic databases relevant to the doctoral studies domain of their thesis.*

### **Description**

Access to databases through the ANELIS PLUS project to the research platforms ScienceDirect, SpringerLink, Web of Knowledge, Scopus, Wiley Online Library is guaranteed.

### **Analysis**

Good access to databases and external sources of information to help the development of the PhD studies.

### **Recommendations**

The indicator is fulfilled.

**Performance Indicator C.2.2.2.** *Each doctoral student shall have access, upon request, to an electronic system for verifying the degree of similarity with other existing scientific or artistic works.*

### **Description**

Based on a request made by the doctoral student and endorsed by the doctoral supervisor, the doctoral student has access, through SCOSAAR-Romanian Academy, to an adequate computer program to verify the percentage of similarity for the doctoral thesis. To meet this condition, based on a request made by the doctoral student and endorsed by the doctoral supervisor, the doctoral student has access, through SCOSAAR-Romanian Academy to the computer platform sistemantiplagiat.ro, adequate to verify the percentage of similarity for the doctoral thesis.

### **Analysis**



Anti-plagiarism is a major concern in the Romanian institutions and, as seen in other universities, the computer platform [sistemantiplagiat.ro](http://sistemantiplagiat.ro) seems to be working properly for the purpose of assessing the originality of the research works.

### **Recommendations**

The indicator is fulfilled.

**Performance Indicator C.2.2.3.** *All doctoral students have access to scientific research laboratories or other facilities depending on the specific domain/domains within the Doctoral School, according to internal order procedures.*

### **Description**

All doctoral students are granted access to scientific research laboratories within the 4 research institutes that conform the PhD program.

### **Analysis**

The infrastructure is at the state of the art in terms of quality and accessibility by the PhD students through the four research centers.

### **Recommendations**

The indicator is fulfilled.

### **Criterion C.3. Internationalization**

**Standard C.3.1.** *There is a strategy in place and it is applied to enhance the internationalization of doctoral studies.*

**Performance Indicator \*C.3.1.1.** *IOSUD, for every evaluated domain, has concluded mobility agreements with universities abroad, with research institutes, with companies working in the field of study, aimed at the mobility of doctoral students and academic staff (e.g., ERASMUS agreements for the doctoral studies). At least 35% of the doctoral students have completed a training course abroad or other mobility forms such as attending international scientific conferences. IOSUD drafts and applies policies and measures aiming at increasing the number of doctoral students participating at mobility periods abroad, up to at least 20%, which is the target at the level of the European Higher Education Area.*

### **Description**

There are mobility agreements with universities abroad, with research institutes, with companies that carry out activities in the studied field, which aim at the mobility of doctoral students and teachers.

At least 35% of doctoral students have completed a training course abroad or another form of mobility, such as participation in international scientific conferences. IOSUD develops and implements policies and action plans aimed at increasing the number of doctoral students participating in training courses abroad, up to at least 20%, which is the target at the level of the European Higher Education Area.



Details are given in Annex 4.15 of the SER.

### **Analysis**

The internationalization of the PhD students seems to be clearly a major concern of the PhD program and important efforts are being done to ensure it.

### **Recommendations**

The indicator is fulfilled

**Performance Indicator C.3.1.2.** *In the evaluated doctoral study domain, support is granted, including financial support, to the organization of doctoral studies in international co-tutelage or invitation of leading experts to deliver courses/lectures for doctoral students.*

### **Description**

Within the evaluated field of study, it is supported, including financially, the invitation of first-rate experts to give courses and lectures for doctoral students.

Through the organized international scientific events, as well as through the invitations launched to some scientific personalities to make visits to Romania, the doctoral students benefited from free access to courses and lectures.

Details in Annex 4.16 of the SER

### **Analysis**

Interestingly, it is observed in Annex 4.16 that the international experts invited to give courses and conferences are most within established training programs or conferences. It would be an asset to create a liberal and agile system to invite individual experts for interactions and the generation of international collaborations.

### **Recommendations**

The indicator is partially fulfilled.

**Performance Indicator C.3.1.3.** *The internationalization of activities carried out during the doctoral studies is supported by IOSUD through concrete measures (e.g., by participating in educational fairs to attract international doctoral students; by including international experts in guidance committees or doctoral committees etc.).*

### **Description**

The institutes and centers with chemistry profile systematically carry out steps in this respect, not concretized until this moment on the background of the important financial resources necessary for the transposition in practice of such activities, within the doctoral studies.

### **Analysis**



The efforts of incorporating international students are still not very successful, despite the efforts in this direction. More strategic and specific planning in this regard would be important to be developed.

### Recommendations

Indicator is partially fulfilled.

### IV. SWOT Analysis

<p><b><u>Strengths:</u></b></p> <ul style="list-style-type: none"> <li>- well structured program</li> <li>- very good research infrastructures and vision</li> <li>- Excellence in research of the PhD supervisors.</li> <li>- Opennes.</li> </ul>	<p><b><u>Weaknesses:</u></b></p> <ul style="list-style-type: none"> <li>- relatively weak internationalization programs.</li> </ul>
<p><b><u>Opportunities:</u></b></p> <ul style="list-style-type: none"> <li>- willing of the supervisors to demonstrate a good level of research and commitment to internationalization</li> <li>- there is plenty of space to increase the interaction with the industrial environment, even if this is already the main aim of some of the institutes</li> </ul>	<p><b><u>Threats:</u></b></p> <ul style="list-style-type: none"> <li>- a relative lack of push in internationalization may hinder the ability of the Academia to become a main player in Europe</li> </ul>

### V. Overview of judgments awarded and of the recommendations

No.	Type of indicator (PI, PI *, CPI)	Performance indicator	Judgment	Recommendations
1.	PI	A.1.1.1.	Fulfilled	
2.	PI	A.1.1.2.	Fulfilled	
3.	PI	A.1.2.1.	Fulfilled	
4.	PI	A.1.2.2.	Fulfilled	
5.	IP	A.1.3.1.	Fulfilled	
6.	PI *	A.1.3.2.	Fulfilled	
7.	PI *	A.1.3.3.	Does not apply	





No.	Type of indicator (PI, PI *, CPI)	Performance indicator	Judgment	Recommendations
8.	CPI	A.2.1.1.	Fulfilled	
9.	CPI	A.3.1.1.	Fulfilled	
10.	PI *	A.3.1.2.	Fulfilled	
11.	PI	A.3.1.3.	Fulfilled	
12.	PI *	A.3.1.4.	Fulfilled	
13.	CPI	A.3.2.1.	Fulfilled	
14.	PI *	A.3.2.2.	Fulfilled	
15.	PI *	B.1.1.1.	Does not apply	
16.	PI *	B.1.2.1.	Fullfilled	
17.	PI	B.1.2.2.	Fullfilled	
18.	PI	B.2.1.1.	Fullfilled	
19.	PI	B.2.1.2.	Fullfilled	
20.	PI	B.2.1.3.	Fullfilled	
21.	PI	B.2.1.4.	Fullfilled	
22.	CPI	B.2.1.5.	Fullfilled	
23.	CPI	B.3.1.1.	Fullfilled	
24.	PI *	B.3.1.2.	Fullfilled	
25.	PI *	B.3.2.1.	Fullfilled	
26.	PI *	B.3.2.2.	Fullfilled	
27.	PI	C.1.1.1.	Fullfilled	
28.	PI *	C.1.1.2.	Fullfilled	
29.	CPI	C.2.1.1.	Fullfilled	
30.	PI	C.2.2.1.	Fullfilled	
31.	PI	C.2.2.2.	Fullfilled	
32.	PI	C.2.2.3.	Fullfilled	

No.	Type of indicator (PI, PI *, CPI)	Performance indicator	Judgment	Recommendations
33.	PI *	C.3.1.1.	Fullfilled	
34.	PI	C.3.1.2.	Partially fullfilled	Additional efforts to invite foreign experts are needed, in order to increase the international collaborations and the visitbility of the Academia
35.	PI	C.3.1.3.	Partially fullfilled	Extra efforts to make doing research in the Academia attractive to foreign students are needed, given the high quality of the research carried out within the four centers.

## VI. Conclusions and general recommendations

The health of the Chemistry PhD program at the Academia Romana is extremely good. Great Phd program, large collection of excellent supervisors, state of the art infrastructure and great projection. The only moderately relevant concern is the problems to obtain good redits of the internationalization, despite the fact that the Academia Romana seems to be very well positined with respect to other institutions in Romania, according to the information provided duringthe evaluation. In particular, the topics supervisros work in are in line with the Horizon Europe program, which needs to be pushed for with the promotion of more international relationships. So, the program is encouraged to help researchers establish a grounded program for internationalization that touches IN and OUT mobility of both students and supervisros and researchers.

Overall, based on the performance of the Academia Romana related to the proposed indicators, the behaviour is excellent and only minor corrections are suggested, as summarized in the table in V. Overview of judgments awarded and of the recommendations.

## VII. Annexes

### VII.1. Annex: Detailed schedule of the visit

Date	time	Activity
October 22nd	16:00-17:00	Meeting of panel members for discussing main methodological asects related to the evaluation of doctoral studies
October 25th	17:00-17:45	Online preliminary meeting for the preparation and harmonization of evaluation steps, in hybrid mode, of doctoral study domains and IOSUD



	18:00-18:45	Online meeting with representatives of the institution and of the Council for Academic Doctoral Studies (CSUD)
October 26th	14:00-14:45	Online meeting the contact person for the doctoral study and the team who drafted the internal report
	15:00-15:45	Online meeting with the academic staff of the doctoral domain
	16:00-16:45	Online meeting with the Commission for Quality Evaluation and Assurance (CEAC) members / Quality Assurance Department
October 28th	10:00-11:45	Continuation of the doctoral study domain evaluation activities
	14:00-14:45	Online meeting with employers of Doctoral graduates in the Chemistry domain
	15:00-13:30	Online meeting with the directors / persons Incharge of the research centers / laboratories within the doctoral study domain
November 2nd	10:00-11:45	Continuation of the doctoral study domain evaluation activities
	14:00-14:45	Online meeting with PhD students
	15:00-15:45	Online meeting with graduates for the doctoral domain
	18:00-18:45	Online meeting with the members of the ethics commission
November 3rd	9:00-9:45	Online technical meeting to identify specific issues to be clarified during the on-site visit
	10:00-16:00	Facie to face working meetings visiting the educational and research infrastructure
November 19th	16:00-17:00	Meetings for conclusions
	17:00-18:00	Final meeting with Academy's representatives



## VII.2. Annex: Educational plans at the different centers

### EDUCATIONAL PLAN ICF

#### Training programme based on advanced university studies 2018-2020

Disciplines and Activies	Course (h)	Seminar (h)	Completion	ECTS
<i>Advanced Courses</i>				
<i>Academic ethics and integrity</i>	14	14	E	15
<i>General methods for research and scientific works elaboration</i>	14	14	E	15
<i>Physical chemistry of nanostructured materials</i>	14	14	E	15
<i>Thin films deposition methods: sol-gel method</i>	14	14	E	15
<i>Methods for characterizing thin films: ellipsometry, XPS, AFM</i>	14	14	E	15
<i>Chemistry of sol-gel processes</i>	14	14	E	15
<i>Thermal phase balance in oxide systems</i>	14	14	E	15
<i>Obtaining nanomaterials using the method of "soft chemistry"</i>	14	14	E	15
<i>Principles and applications of fluorescence spectroscopic methods, RES and circular dichroism</i>	14	14	E	15
<i>Methods for materials characterization</i>	14	14	E	15
<i>Physico-chemical properties of polysaccharides</i>	14	14	E	15
<i>Water-soluble polymers modified hydrophobically</i>	14	14	E	15
<i>Water-soluble polymers marked with fluorophores</i>	14	14	E	15
<i>Spin-marking method</i>	14	14	E	15
<i>Principles and applications of electronic spin resonance spectroscopy</i>	14	14	E	15
<i>Characterization of polymer gels</i>	14	14	E	15
<i>"Host-guest" supramolecular systems</i>	14	14	E	15
<i>Coupled spin systems in coordination chemistry</i>	14	14	E	15
<i>Computational simulation and modeling of nanomaterials</i>	28	-	E	15
<i>Mesostructured oxide materials with catalytic and photocatalytic properties</i>	14	14	E	15
<i>Nanomaterials obtained by methods of "soft chemistry"</i>	14	14	E	15
<i>Individual scientific research programme</i>	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	
<i>Scientific research project</i>	x			25
<i>Oral presentation analyzing the scientific literature</i>	x			20
<i>Research report No. 1</i>		x		40
<i>Oral presentation analyzing the scientific literature</i>		x		20
<i>Research report No. 2</i>			x	40
<i>Oral presentation analyzing the scientific literature</i>			x	20
<i>Preliminary defense of the doctoral thesis</i>			x	
<i>Public defense of the doctoral thesis</i>			x	x

Note: the first 2 courses are compulsory, the other 2 courses are selected from those mentioned in the Table, according to the specifics of the doctotal theme.



## EDUCATIONAL PLAN ICT

### *Training programme based on advanced university studies 2018-2020*

No.	Discipline	Code	hours/week				K	Evaluation Form
			C	S	L	SI		
1	<i>Complex combinations – precursors for advanced materials</i>	DOb	2	2		20	15	E
2	<i>Responsive materials to external stimuli</i>	DOb	2	2		20	15	E
3	<i>Study methods at molecular level of organic compounds</i>	DOb	2	2		20	15	E
4	<i>Texture and morphological study methods of nanostructured materials</i>	DOb	2	2		20	15	E
5	<i>Magnetic properties of nanocomposites</i>	DOb	2	2		20	15	E
6	<i>Coordination chemistry - structure, properties</i>	DOb	2	2		20	15	E
7	<i>Engineering of crystallization process for coordination compounds</i>	DOb	2	2		20	15	E
8	<i>Complex combinations – precursors for supramolecular systems</i>	DOb	2	2		20	15	E
9	<i>Coordination polymers</i>	DOb	2	2		20	15	E
10	<i>Experimental synthesis and analysis techniques in porphyrin chemistry</i>	DOb	2	2		20	15	E
11	<i>Sustainable organic chemistry. Applications in heterocycle chemistry</i>	DOb	2	2		20	15	E
12	<i>Analytical chemistry. Applications of porphyrins in medical and environmental monitoring.</i>	DOb	2	2		20		E
13	<i>Academic Ethics and Integrity</i>	DOb	2	2		20	15	E
	Total hours week/semester*		2/28	2/28		20/280		

Code: DOb – compulsory discipline; DO – optional discipline; DF – non-compulsory discipline; C – course; S – seminar; L – laboratory; SI – individual study; K – credits; Evaluation form: E – examination; AC – research activity; P – project, R – report.

\* Courses 1-12 were coupled **two by two up to four** according to the doctoral field of the student in order to ensure the knowledge standard and a minimum of courses **28 hours/semester**, seminars **28 hours/semester**. Study ensured by the manual, course support, bibliography and notes: **minim 120 hours/semester**. Additional documentation in library, on specialised electronic platforms: **minim 80 hours/semester**. Preparation for seminars/laboratories, homework, reports, portfolios and essays: **minim 80 hours/semester**. Tutoring: **minim 35/semester**.

*CCO did not have doctotal students in the preparatory period in the evaluated period*



## EDUCATIONAL PLAN ICMPP

*Training programme based on advanced university studies 2018-2020*

No.	Discipline	Code	hours/week				K	Evaluation form
			C	S	L	SI		
1	<i>Academic ethics and integrity (1<sup>st</sup> sem.)</i>	DI	3	2		8	15	E
2	<i>Macromolecular chemistry (1<sup>st</sup> sem.)</i>	DI	3	2		8	15	E
3	<i>Polymer physics (2<sup>nd</sup> sem.)</i>	DI	3	2		8	15	E
4	<i>Specialized complementary discipline specific of the research theme (2<sup>nd</sup> sem.)</i>	DO	2	2		4	15	E
5	<i>Specialized complementary discipline specific of the research theme (non-compulsory) (2<sup>nd</sup> sem.)</i>	DF	2	2		4	(15)	(E)
	<i>Scientific activity under the supervision of the scientific supervisor and guidance team (1<sup>st</sup> &amp; 2<sup>nd</sup> sem.)</i>	DI			14/11		-	AC
6	<i>Project of scientific research (under the supervision of the scientific supervisor and guidance team) (3<sup>rd</sup> sem.)</i>	DI			20	20	40	P
	<i>Research report no. 1 (under the supervision of the scientific supervisor and guidance commission) (4<sup>th</sup> sem.)</i>	DI			30	10	40	R(1)
	<i>Research report no. 2 (under the supervision of the scientific supervisor and guidance commission) (5<sup>th</sup> sem.)</i>	DI			30	10	40	R(2)
	<b>Total hours week/semester</b>		<b>13</b>	<b>10</b>	<b>94/91</b>	<b>28</b>	<b>180 (195)</b>	

DI – imposed discipline; DO – optional discipline; DF – non-compulsory discipline; C – course; S – seminar; L – laboratory; SI – individual study; K – credits; E – examination; AC – research activity; P – project, R – report.