

I hereby endorse

Director



Arsen Arakelyan

"14" February 2017



DOCTORAL PROGRAMME SELF-ASSESSMENT

Institute of Molecular Biology of the National Academy of Sciences of the Republic of Armenia

(Name of the Institution)

03.00.03 Molecular and Cellular Biology

(Name and code of the specialty)

7, Hasratyan St., Yerevan 0014, Armenia

(Address of the Institution)

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<i>Please insert rows, if necessary</i>		

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1. Institutional strategies

The Higher Education Institution's (hereinafter HEI) research strategy is in concord with its mission and goals.

Please mention the research ambitions of the HEI and describe the formation of research strategy reflecting the ambitions of the HEI in research.

1.1 HEI has a research strategy that is adopted at the institutional level of the HEI, represents the institution's mission and its goals for research.

Research strategy of IMB is described by its [Statues](#) and [Strategic Development Plan for 2010-2020](#) developed by IMB leadership.

The mission of IMB of NAS RA is to conduct basic and applied research in the field of molecular and cellular biology. Research objectives are focused at elucidation of regulatory mechanisms of cell activity in health and their alterations in complex human and animal diseases, with special focus on mediators of the immune and signal transduction systems. An important area of the research is the characterization of the Armenian genome based on patho-, and population genomics approaches.

The educational objective of IMB is to provide fundamental knowledge and practical skills and train highly qualified and competitive specialists through delivering research oriented Master's and PhD programs.

1.2 Research strategy reflects the needs of the internal and external stakeholders and includes ethical concepts.

The research strategy of Institute of Molecular Biology of (hereinafter IMB) is designed to meet the needs of a range of internal and external stakeholders, such as scientific groups, faculty, students, alumni, academic and educational collaborators, and broader scientific community and relevant industry.

The scientific activities of IMB are focused on addressing important challenges of human well-being and health. The output of the studies performed at IMB is the elucidation of molecular and cellular etiopathomechanisms of many polygenic and multifactorial diseases and identification of vital molecular biomarkers and therapeutic targets of diseases. Another important output is identification of new physiologically active compounds of potential therapeutic significance. Application areas include molecular diagnostics, prognostics, prophylaxis, and treatment of diseases, monitoring of disease progression and the efficiency of applied therapy as well as new drugs design.

We tend to work closely with various medical and scientific centres, governmental and non-profit organizations, believing that the society benefits the most when the knowledge is freely disseminated among all players.

IMB has established an Ethics Committee/Internal Review Board (IORG0003427, <http://molbiol.sci.am/councilsethcomm>), which is registered by the U.S. Department of Health and Human Services and is called to guarantee ethical standards of research involving human subjects, particularly:

- Research involving human subjects conducted or supported by the Department of Health and Human Services, or other federal departments or agencies that apply the Federal Policy for the Protection of Human Subjects to such research;
- Clinical investigations regulated by the Food and Drug Administration (FDA) of the Department of Health and Human Services.

The research within the PhD program is approved by the Ethics Committee for the eligibility of animal/human sample involvement and usage.

1.3 HEI has formal mechanisms and procedures to evaluate the effectiveness of research strategy and to further improve it.

IMB has developed a comprehensive evaluation scheme and is constantly reviewing its applicability to the existing internal procedures and overall research strategy. This evaluation mechanism is called to assess the Institution's core strategy, faculty development, research approach and scientific outcome, excellence in learning, and relevance to the national priorities. Based on this appraisal IMB is able to achieve institutional, operational and departmental level goals through better resource allocation and optimised functioning.

The formal evaluation mechanisms include:

- Evaluation of efficacy based on objective measures such as number of published papers, total impact of published papers, number of ongoing projects and their funding extent, number of attracted PhD students, active participation in international and national scientific meetings;
- Semi-annual and annual reporting of laboratory/group activity (http://molbiol.sci.am/sources/annual_report_2016.pdf);
- Assessment of overall annual activity of the research staff and triennial attestation (([Laboratory efficacy criteria](#) and [Resolutions of Scientific Council](#))).

2. Doctoral program

The doctoral program's ambitions are in concord with the institution's research strategy, forms part of institutional planning and resource allocation, is designed to meet new challenges and needs of global labor market.

Please analyze how the doctoral program intended learning outcomes are achieved (stressing student progress).

2.1 Doctoral program is thoroughly formulated, according to the intended outcomes, is flexible, meets the needs of doctoral candidates and is in line with the institution's research strategy.

[PhD program in Molecular and Cellular Biology](#) has been developed to comply with all regulations set forth by the state agencies with special focus on delivering high-quality, research-oriented program capable of meeting needs of prospective students for their future career development, based on [Strategic Plan \(Resolution of Scientific Council on its approval\)](#). The PhD education procedures are performed through concerted activities of several structures acting both within IMB and ISEC NAS RA.

The objective of the Molecular and Cellular Biology Curriculum is to facilitate the development of independent and highly motivated students into creative molecular and cellular biologists. It provides a platform for developing scientific literacy and building up fundamental knowledge and skills for lifelong learning in science and technology.

The program is continuously updating to comply with both theoretical and practical achievement in the relevant field of sciences. The Institution's highly qualified doctoral candidates will fit well into and develop an excellent career both in the domestic and international labor markets.

The program is intended at the development of following skills and abilities:

1. Do individual research, solve a scientific problem independently and acquire professional knowledge; be part of a team of experts doing research on the same topic.

Necessary knowledge of the particular research field and sufficient knowledge of research topic

- present research results through articles, presentations and/or thesis (also by involving Master students in various research groups within base funding programs);
- conduct analysis, surveys, fact finding, and evaluation developing and strengthening analytical and critical thinking;

- have command over databases and statistics, use appropriate literature.

2. Acquire soft skills

- communicate both with their peers in a teamwork allowing and promoting researchers' participation in various seminars and conferences (with either a report or a poster as a mandatory requirement); the competences to present own research are important, but to CARRY OUT individual research and guidance to do that are the central point;
- Support of the Academy in the research organization of seminars and/or other relevant events by the researcher's initiative;
- Promotion by the Academy of the ability to provide clear communication and presentation skills via a special course on communication skills during the course of study;
- Development of skills aimed at establishing international relations;
- Taking lectures: researchers are required to obtain academic and paper writing skills thus strengthening their competences and knowledge of the field.

3. Teamwork ability skills, team management and fundraising skills

- PhD researchers are to manage organized student groups and conduct mentorship of student groups thus strengthening their teamwork abilities and team management;
- Academy offers seminars and round tables over different mechanisms of grant proposals including successful grant projects, different ways and types of searching and applying for grants.

4. Teaching, supervision and/or mentorship skills

- PhD program equips researchers with teaching and other practical competences like mentorship through mandatory courses which are to be lectured by researchers.
- **Individual autonomy, initiative, entrepreneurship skills**
- **Ethical behavior, good scientific practice, sustainability, accountability, professional behavior.**

2.2 Doctoral program is contextually coherent with other relevant doctoral programs.

The Molecular and Cellular Biology Curriculum is designed to be in line with several highly demanded doctoral programs offered by acknowledged European centers. We believe that active collaboration with different scientific centres worldwide makes our program richer and more coherent to the modern educational plans. Particularly, benchmarking was performed against

The Hartmut Hoffmann-Berling International Graduate School of Molecular and Cellular Biology (<http://www.hbigs.uni-heidelberg.de/>).

2.3 Doctoral program is functioning in the context of a strong research environment ensuring critical mass of researchers and relevant resources promoting interdisciplinary approach.

IMB is one of the leading biomedical research organizations in Armenia. We managed to create strong research environment (in terms of both research staff and technical capabilities) that is highly conducive to the success of implementation of PhD programs. Among 90 researchers at IMB 14 hold DSc degree and 55 hold PhD degree. Our researchers have substantial number of publications in impact factor journals in their relevant fields. Most of the research staff has experience of working in Western research institutions and conducting multidisciplinary research. Scientific Council and Young Scientists Councils of IMB regularly organize workshops and seminars that are well-attended.

International students are regularly admitted with over 5 foreign PhD students having successfully defended and continuing their careers abroad.

IMB actively participates in educational activities and offers three degree programs. Our researchers deliver lectures and supervise graduate, undergraduate and postgraduate students from Armenia and abroad.

Educational units operating under the umbrella of IMB:

- 1) Department of Molecular and Cellular Biology (<http://isec.am/en/departments/department-of-molecular-and-cellular-biology.html>). The Department of Molecular and Cellular Biology of the International Scientific-Educational Center of the Republic of Armenia was founded in 2006 on the technical and methodological basis of Institute of Molecular Biology of NAS RA. The establishment of the department proceeded from the importance of the role of Life Sciences and the need to train highly qualified specialists for the improvement of life quality and standards, which are of vital importance for carrying out research activities in the field.

The department offers a Master's degree program in Molecular and Cellular Biology.

- 2) Department of Bioengineering and Bioinformatics and Molecular Biology (<http://international.rau.am/eng/discoverRAU/institutes-departments>). This unit was established jointly with the Russian-Armenian (Slavonic) State University in 2011 in response to a growing need for qualified workforce in corresponding fields of biomedical sciences.
- 3) As a part of educational system in Armenia inherited from the Soviet times, PhD programs are offered by the research institutes gathered under the umbrella of National Academy of Sciences. Currently, our Institute offers PhD program in Molecular and Cellular Biology,

PhD program in Biochemistry and PhD program in Genetics.

In addition, IMB hosts students from Yerevan State University for hands-on training courses in molecular and cellular biology and genetics.

The ultimate aim of the educational programs at IMB is to train skilled and experienced specialists who will contribute to the development of knowledge-based economy in Armenia and worldwide. This is achieved by offering high-quality, research oriented, clearly defined degree programmes capable of meeting the needs of prospective students, as well as taking into account the needs of the labour market worldwide. Within IMB, strong research environment and mechanisms to enhance the quality of educational programs have been built and are maintained continuously. Moreover, the PhD programs at IMB are successful starting points for future career development in the industry or academia. Career development issues are especially important for our programs. In Armenia the labor market is limited, thus, a special focus on international career opportunities is pursued.

The undergraduate educational program trains specialists that can readily continue their academic career both in Armenia and worldwide. In addition, our graduates are good candidates for employment in diagnostic laboratories and pharmaceutical companies within the country.

Statistics on alumni careers demonstrated that the employment rate is approximately 60%. The Department of Molecular and Cellular Biology has 31 graduates so far, out of which 7 are employed (or continued with PhD study) at our institute, 5 obtained permanent positions at other research and educational organization in Armenia, 3 have found a job in a hospital or private diagnostic laboratories, and 4 continued their research career in European, US and Russian scientific organizations.

The Department of Bioinformatics, Bioengineering and Molecular Biology has 35 graduates so far, out of which which 8 are employed (or continued with PhD study) at our institute, 8 obtained permanent positions at other research and educational organization in Armenia, 7 have found a job in hospitals or private diagnostic laboratories, and 2 continued their research career in European, US and Russian scientific organizations.

2.4 Doctoral program provides training in core discipline areas and transferable skills and ensures an active involvement of doctoral candidates in research activities.

Molecular and Cellular Biology Curriculum is developed to provide extensive training in core disciplines of molecular and cellular biology, biochemistry, genetics and biomedicine, as well as development of transferrable skills. These trainings are provided within the educational component of the Program, which includes general *and professional courses and internships*.

The *general courses (20 credits)* serve to ensure and complement soft skills needed for the PhD qualification. The courses aim to form transferable competences for PhD students. *They consist* of 5 mandatory courses and 2 elective courses each from 1 to 6 ECTS credit workload.

The *professional courses* ensure PhD candidate's professional knowledge and skills. *Professional courses* include three courses (12 credits) and 2 professional examinations each equals to 5 credits (total of 10 credits). Professional courses include:

- Molecular Biology
- General Biology
- Genetics
- Biochemistry
- Bioinformatics

Internships ensure increase in researcher's scientific-pedagogical skills and include conducting practical and seminar courses at Master Studies, laboratory works, as well as supervising term papers and final papers in Bachelor's level. The internships are held on a program jointly formed and confirmed by the PhD student and his/her supervisor. The attestation is held based on appropriate documents confirming the performance.

PhD students are involved in:

1. Master's Program courses at the Department of Molecular Biology of ISEC
2. Diploma Specialist Program courses at the Department of Bioengineering and Bioinformatics at RAU
3. Diploma Specialist Program courses at the Department of Medical Biochemistry at RAU
4. Supervision of bachelors' and masters' theses at the Faculty of Biology of YSU.

2.5 Doctoral program has set criteria on the assessment of the quality of research results against achieved outcomes and mechanisms for the evaluation of the research results' social impact.

In line with IMB's philosophy, our doctoral program includes criteria for evaluation of the quality of research results. They are adapted from the general requirements to PhD thesis, such as novelty and originality, potential applicability in relevant industry, recognition of research by scientific community. The main criterion defining the quality of research is having at least one paper published in an international peer-reviewed journal ([Resolution of Scientific Council](#)).

The mechanisms of evaluation include:

- 1) [Annual attestation by Scientific Council of IMB](#),
- 2) Periodic attestation by Supervisor(s),

- 3) Number of publications in international peer-reviewed journals,
- 4) Participation in international conferences,
- 5) Funding attracted by student.

The sample annual attestation report is available in [Appendix](#).

2.6 There are set mechanisms and procedures in place to ensure development, approval, monitoring and periodic review of doctoral program with an active involvement of internal and external stakeholders.

The mechanisms and procedures are formalized and approved by Scientific council of the Institute. They still have to be developed.

3. Admission Policy

HEI's admission policy on doctoral program is transparent, is in line with doctoral program's ambitions.

Please analyze whether the selection mechanisms of doctoral candidates are aligned with the doctoral program's ambition.

3.1 HEI has set mechanisms for promoting equitable recruitment, selection and admission procedures.

The International Scientific-International Center of NAS RA is in charge of organizing the admission procedure in line with the governmental resolutions.

Admission of local students

The admission of local students is carried out in line with the [Regulation on Admission to PhD, Registration of Doctoral and PhD Seekers \(Low-residency students\) of ISEC NAS RA](#).

PhD program applicants should have completed master's degree program or have certified professional qualifications.

To be eligible for PhD studies an applicant should pass tests in foreign language, informatics and Information Communication skills according to the minimum grade threshold defined by RA Ministry of Education and Science for the current academic year.

Submission of documents for a full-time PhD program starts in May in line with the number of PhD student positions allotted and schedule defined by RA Ministry of Education and Science.

The announcements of the call for the submission of documents can be found at:

<http://www.isec.am/en/admissions/phd/admission.html>

PhD applicants submit their documents to PhD Studies Department at ISEC NAS RA, while professional examinations are held within the first ten days in June. The questionnaires of the professional examinations for the given year can be found at: <http://www.isec.am/en/question-list>

Submission of documents for a part-time PhD program starts in October, while professional examinations are held during the first ten days in November.

The professional examinations are held in IMBof NAS RA according to the [question list annexed to the PhD Program](#).

Admission of foreign students

The admission of the foreign students is carried out in line 'Regulation on Admission of Foreign Students to Higher Educational Institutions of the Republic of Armenia, As Well As Admission of Family Members of Diplomats Working in Diplomatic Service Bodies of the Republic of Armenia Operating in Foreign Countries' № 700-Ն dated on 28 April 2011 and '[Regulation on Organization of Admission of Foreign and Diaspora Applicants](#)' approved by ISEC NAS RA.

All the governmental resolutions, decrees and internal regulations on admission process at the Academy can be found on the website of ISEC at: <http://www.isec.am/en/admissions/phd.html> and <http://www.isec.am/en/about-us/regulations.html>.

3.2 Selection criteria of doctoral candidates are transparent, publicly available and are in line with the explicit outcomes of doctoral program.

The selection criteria are set down in [Regulation on Admission to PhD, Registration of Doctoral and PhD Seekers \(Low-residency students\) of ISEC NAS RA](#) , which says:

2.1.24. Holding Competition

2.1.25. The competition is held according the received grades for the professional exam. In case of equal grades the following indicators are taken into account according to the following order:

- a) GPA in the Diploma Supplement of a Master's degree holder or that of a qualified specialist
- b) GPA in the Diploma Supplement of a Bachelor's degree holder or that of a qualified specialist
- c) The number of published scientific papers
- d) diplomas received from international or republican student competitions and Olympiads or reports of participation in international conferences.

This information is provided to the PhD applicant together with the announcement on PhD

admission, as well as it can be found at:
http://www.isec.am/images/phd_paymanner /PHD_yndunelutyan_paymanner_new.pdf

2.1.26 The resolution on the admission to a PhD program is made by RA NAS Presidium, while the admission is implemented by the decree of the director of the relevant research organization.

3.3 HEI periodically analyses the effectiveness of applicants' assessment system.

Neither IMB nor ISEC NAS RA carries out qualitative analysis of the applicants' assessment system, they produce quantitative data on the admission figures, which can be found in the Annual Report of NAS RA.

4. Supervisor

HEI provides highly qualified supervisors/well structured supervisory team to achieve doctoral program's ambitions.

Please analyze how the HEI assures sufficient supervision motivated for the implementation of doctoral program's ambition.

4.1 Supervisors/supervisory team responsibilities, qualifications, workload, recognition criteria are comprehensively stated and described and are in line with doctoral program's ambitions.

The Doctoral program includes description of supervisors/supervisory team responsibilities, qualifications, workload, recognition criteria.

As a rule, a scientific supervisor should hold a degree of Doctor or Candidate of Sciences (PhD). PhD mentoring permission is given to those researchers who have at least 30 published articles in respective topic. To have a balanced workload, no more than 5 doctoral candidates are allowed per supervisor.

In addition, PhD student is also co-mentored by a non-formal mentoring team, which is formed by all supervisors from IMB (usually 3-4 people). The mentoring team works in close collaboration with the doctoral candidate and supervisor, monitors the progress of the study independent from their annual assessment and participates in handling supervisor-student conflicts.

4.2 HEI has supervisor/ supervisory team appointment procedures.

The Supervisor is chosen by the Scientific council of IMB based on the following criteria:

1. Research activity, which is indicated by the number of publications in peer-reviewed

journals, books/chapters, participation in the international scientific events;

2. Sufficient resources and funding, which is indicated by the number of previous and ongoing projects funded by local and international agencies;
3. Previous history of PhD student supervision (not required for “newcomer” supervisors).

The young scientists start their supervisor career, usually after completing the PhD degree, by supervising master theses, then working with PhD students as co-mentors.

4.3 HEI has motivation mechanisms for supervisors to be involved in active researching and be part of relevant scientific network.

As IMB is mainly a research institution, activities in this field are compulsory. However, supervisors are promoted materially and additional funding for research teams is provided through special grants targeting young researchers and doctoral candidates (<http://molbiol.sci.am/rdprojects>). Minimum one and, on average, 2-3 young scientist and PhD students are enrolled in the research grant projects.

4.4 There is well-established system for periodic evaluation of supervision that foster to review existing policies and procedures for supervision and to reveal the professional needs of supervisors.

Evaluations of supervisor are conducted as a part of periodical evaluation of overall activities of the research staff of IMB (see 1.3).

4.5 HEI fosters the development and professional progress of supervisors.

IMB constantly fosters the development and professional progress of the supervisors as a part of general strategy for professional development of research staff of the Institute. These include fostering the publication activity, participation in various scientific meetings proposal development and participation/conducting training events. Being a supervisor enhances the career development of a researcher, since s/he obtains not only valuable experience, but is also promoted to a leading researcher position with higher remuneration and opportunities to progress further. Average number of publications of a supervisor is 5 papers in national and international peer-reviewed journals, participation in 2 international conferences and 2 research and related activities abroad (See Annual Report for 2016 at http://molbiol.sci.am/sources/annual_report_2016.pdf).

5. Research Environment

HEI promotes the quality research provisions by creating an environment conducive to research.

Please analyze how the HEI ensures the proper implementation of the doctoral program.

5.1 There are necessary resources for the implementation of doctoral program in accordance with its content, which effectively support the implementation of program's ambitions and create an environment conducive to research.

IMB tends to provide all necessary technical and educational resources to the doctoral program, so that both its theoretical and applied components are fully and effectively realized. Our laboratory equipment and supplies, as well as highly qualified scientific atmosphere, support the establishment of efficient research environment. Students are encouraged to apply for short term research fellowships to conduct part of experiments in research organizations abroad.

IMB is located in a 7-storey building with total space of 10,000 sq.m. It has 24/7 electrical power and water supply. Most of the high-valued equipment connected to the electrical grid through uninterrupted power sources. Several distillators and deionizing water machines are available. On average, three labs are located on each floor. A typical laboratory has 10 rooms, including lab space and offices for staff. All labs are equipped with all necessary routine lab appliances and have facilities for basic microscopy, histology and assays such as ELISA, PCR and electrophoresis. IMB has several shared facilities used by different research units such as Sanger sequencing facility, cell line collection, animal facility, library and high-performance computing system for protein molecular dynamics simulations and functional genomics analyses. IMB has a conference hall equipped with a projector, 3 lecture rooms and a computer classroom with 5 computers. Practical courses take place in lab space in corresponding research units.

The full description and enumeration of the equipment and devices owned by IMB can be found in the Appendix 2 of [Strategic Development Plan for 2010-2020](#).

Full details about laboratories and research groups are available at <http://molbiol.sci.am/resunits>

All the researchers, academic staff and students at IMB have access to the Fundamental Scientific Library of NAS RA (FLS), which is a leading scientific library in Armenia with its technical equipment and in terms of providing quality information is close to international and European standards with its three million physical documents reflecting different formats and different fields of science, the advisory center of creating digital content, having librarians specialized in the field of librarianship, many collections in Armenian, Russian, European and Eastern languages. The FLS is a hub of different digital collections; it serves as distribution chain of results of knowledge and research in the fields of science together with the libraries of NAS

RA institutions.

The Fundamental Scientific Library of NAS RA has 27 individual collections established based on the donations of science and culture prominent figures, 3 specialized reading rooms, individual funds, depositories, more than 17,000 visitors a year. There is also a range of database resources for library users: elibrary.ru, mathnet.ru, SPRINGER, EBSCO, DOAJ. The library has Wi-Fi connection in its area. The library implements the service of an educational fund with the principle of open shelves, where readers choose books from the bookshelves, then register in the electronic system.

5.2 HEI monitors the scientific progress of the individual doctoral candidates by achieved scientific results and provides career development opportunities. Supervisors have primary responsibility in doctoral candidate's scientific progress.

For each doctoral candidate [an individual study plan](#) is drawn by his/her supervisor at the beginning of the research, which is evaluated and approved by the Scientific Council of IMB. The obtained results are routinely evaluated and the research course correspondingly adjusted, which guarantees the accurate track of the study for reaching its ultimate goals. Career development opportunities are provided to successful candidates for further post-doctorial research.

Criteria for study progress assessment include:

Number of published papers (minimum one in an international peer-reviewed journal indexed in ISI Web of Science and Scopus)

Relevance of publications to the topic of PhD study

The career development includes establishment of young researcher independent research groups for the most successful student within 3 years upon completion of PhD (Resolution [of Scientific Council on establishing young research groups](#)).

In 2011-2016 four young research groups were established:

A. Arakelyan – Group of Bioinformatics, More details available at:

http://molbiol.sci.am/resun_bioinfo

D. Poghosyan – Group of Regulation of Immune Response, More details available at:

http://molbiol.sci.am/resun_immrespreg

N. Babayan – Group of Cellular Technologies, More details available at:

http://molbiol.sci.am/resun_celltech

H. Zakaryan – Group of Antiviral Response Mechanisms, More details available at:

http://molbiol.sci.am/resun_antdefmech

5.3 HEI ensures that all doctoral candidates receive useful and regular information and advice to promote research and to have opportunity to work in research teams and different research environments.

Journal clubs are held on a weekly basis, where international scientific papers and achievements are discussed. Supervisors provide hands-on trainings on project proposal design and development on regular basis. Research results of the scientific staff of IMB, including those of doctoral candidates, are presented and discussed during the scientific meetings held monthly. International young scientists' schools and conferences are organized annually, where guest scientists from different countries give lectures and training (<http://molbiol.sci.am/conferences>). This gives an excellent opportunity to share and discuss the research results with the international scientific community, which provides further opportunities of collaboration. PhD students are encouraged to apply for short-term travel fellowships to conduct part of their research in partner organizations abroad and to participate in international scientific events relevant to the field of their PhD topic. In addition, supervisors are advised to allocate funds for travel while applying for research grants, where applicable.

In 2014-2016 PhD students were involved or were designated as a PI in 29 research grants.

In 2014-2016 PhD students participated in 45 international conferences and schools and 48 short-term research fellowships.

5.4 HEI has sound financial distribution policy and capacity to sustain and ensure the integrity and continuity of doctoral programs at the institution.

The state funding of science in Armenia has two main formats: 1) basic financing of state institutions for preserving the infrastructure; 2) thematic financing of projects proposed by research teams selected on competitive bases. Basic financing extent limited and do not include enough funding to sustain integrity and continuity of the Program. Maintaining of the program is implementing through intensive fund raising by IMB, supervisors and PhD students. IMB fosters supervisors to actively apply for national and international funding (see list of grants at <http://molbiol.sci.am/rdprojects>).

5.5 HEI has mechanisms in place for the evaluation of the effectiveness, applicability and availability of resources.

No formal mechanisms are developed for evaluation of the effectiveness, applicability and availability of resources, nevertheless all the needs are discussed during internal and formal meetings and priorities are set for the submission of a grant on obtaining equipment or other resources.

6. Doctoral Candidates

Doctoral candidates are recognized as professionals with commensurate rights.

Please analyze whether the doctoral candidates are part of implementation of the HEI's ambitions in research.

6.1 HEI has formal mechanisms to regulate relations between candidate, supervisors and institution where the rights and responsibilities of doctoral candidates are clearly formulated.

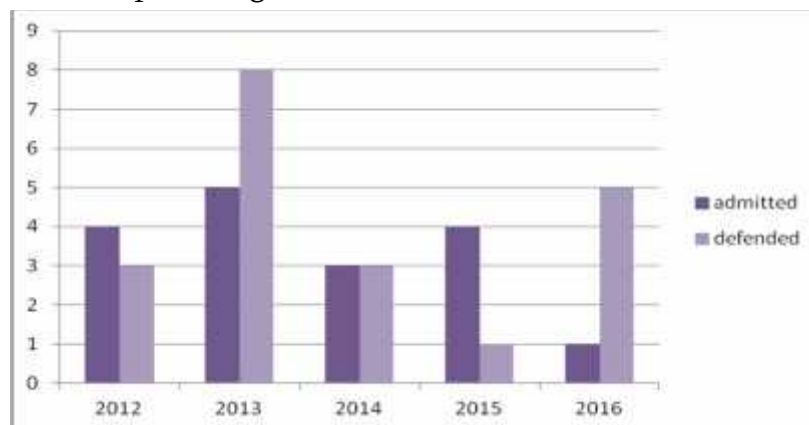
So far ISEC has made use of the [governmental exemplary contract](#), which is signed mandatorily with all PhD students both in full-time and part-time modes. Recently ISEC has developed a new [trilateral agreement](#) to be signed among the head of the research organization, the scientific supervisor and a PhD student. As soon as the Presidium of NAS RA adopts it, it will be mandatory for all research organizations of NAS RA.

6.2 Doctoral candidates are engaged in governance at the university and participate in decision-making.

All doctoral candidates are members of the Young Scientist Council of IMB of NAS RA. The council holds regular meetings and has an anonymous voting system. A representative of the Young Scientist Council has a chair in the Scientific Council of IMB, brings up issues concerning this population and participates in all the votes, thus being directly involved in the governance of IMB (<http://molbiol.sci.am/councils>). All doctoral candidates participate in the election of the Director of IMB.

Besides, IMB has set a practice of employing its PhD students as junior researchers, thus fully involving them in all internal and formal decision-making processes. Out of 17 students 13 (77%) were employed as a junior researcher from the moment of admission in 2013-2016.

The table below shows the percentage of admitted and defended students for 2013-2016:



6.3 HEI has set mechanisms that ensure quality of the student services and doctoral candidates are involved in the quality assurance practices.

IMB has no formal mechanisms to ensure the quality of student services and doctoral candidates, nevertheless all the complaints, proposals for improvement are discussed a) at the meetings of the Young Scientists Council, b) individually with supervisors and co-supervisors, c) at the meetings of the Scientific Council on the initiative of either supervisors or the representative of the Young Scientists Council and d) at the meeting with director.

7. Internationalization

Internationalization is coherent with institution's research strategy and the individual needs of the doctoral candidates.

Please analyze how the HEI strives to be a part of local and international research networks by the implementation of the doctoral program.

7.1 HEI promotes fruitful and effective collaboration with local and international counterparts aiming to create critical mass and networking as well as to implement joint research and doctoral programs.

IMB is integrated into the international research area establishing close partnership with internationally acknowledged research and educational centers and units worldwide (<http://molbiol.sci.am/collaboration>), which facilitates the mobility of PhD Students. PhD students are encouraged to apply for short-term travel fellowships to conduct part of their research in partner organizations abroad and to participate in international scientific events relevant to the field of their PhD topic. In addition, supervisors are advised to allocate funds for travel while applying for research grants, where applicable.

7.2 The mobility of doctoral candidates is driven by the candidates' research projects.

IMB encourages the mobility of doctoral candidates and supervisors through various scientific exchange programs such as DAAD, Fulbright, Marie Curie Mobility actions in the framework of Horizon 2020 and Erasmus Plus, joint research projects and conference participations. A significant portion of IMB research staff (~40%) has been trained in well-known international scientific centers worldwide. In 2014-2016 PhD students participated in 45 international conferences and schools and 48 short-term research fellowships.

7.3 HEI allocates sufficient financial resources for internationalization.

For internationalization IMB is mainly supported by the Armenian government ([State Committee of Science of the Republic of Armenia \(SCS\)](#)).

Various projects implemented by IMB researches are supported with national and international grants, provided on a competitive basis:

- [Armenian National Science and Education Fund \(ANSEF\)](#),
- [National Foundation of Science and Advanced Technologies jointly \(NFSAT\)](#),
- [Volkswagen Foundation](#),
- [European Commission under the EU's Seventh Framework Program for Research](#),
- [United Nations Educational, Scientific and Cultural Organization \(UNESCO\)](#),
- [Federal Targeted Program of the Russian Federation](#),
- [International Science and Technology Center \(ISTC\)](#),
- [NATO Science for Peace and Security Program](#),
- [US Civilian Research and Development Foundation](#),
- [Bureau of Educational and Cultural Affairs, US Department of State](#),
- [International Visegrad Fund, EU](#),
- DAAD, Germany.

The list of travel activity for 2014-2016 is available in the [Appendix \(Mobility Report\)](#).

8. PhD awarding

HEI has clear mechanisms for monitoring and assessment of the research results (applicable to the institutions having Specialized Councils).

Please analyze how the Specialized Councils acknowledge the formation of an autonomous researcher.

8.1 Specialized Council has PhD awarding criteria that are applied and periodically reviewed.

IMB has a Specialized Council №042 (<http://molbiol.sci.am/council042/index>) operating at IMB since 2014 in line with the regulations adopted by the Supreme Certifying Commission (www.boh.am).

SCC confirms the academic degrees granted by specialized councils and the academic nominations accorded by scientific councils and confers correspondingly a trilingual (Armenian, English and Russian) scientific degree diploma. Its main functions include:

1. Establishment of specialized councils and its administration,
2. Maintenance of research quality standards,
3. Issuing scientific degrees and diplomas of state standards.

8.2 HEI has set criteria for the nomination of the members of Specialized Council.

The criteria set for the nomination of the members of the Specialized Council are quite formal: they should have a relevant PhD or Doctoral degree and have field-specific publications. They are also supposed have significant contribution into the research of the specific field (be active researchers) and from 5 to 10 research papers published within the last five years.

8.3 HEI periodically implements quality assurance of Specialized Council/s' activities.

IMB has no set mechanisms for the quality assurance of the Specialized Council, nevertheless, the statistics shows that since 2015 no PhD thesis defended at this council has been rejected or returned by Supreme Certifying Commission for double discussion or defence. By signing the agreement to become a member of the specialized council, each member acknowledges that a PhD thesis shall be original research to be eligible for defense and strictly adhere to the enforcement of this principle.

Besides, IBM has set strict criteria in regard with a PhD thesis in its PhD education roadmap which are as follows:

A PhD thesis must be an independent, scientific work complying with high academic standards with regard to research questions, examination of concepts, methodological, theoretical and empirical basis and form of presentation.

The PhD thesis determines whether the PhD candidate is ready to carry out independent, original and scientifically significant research, and to critically evaluate work done by others.

PhD candidates must prove that the results are recognized in the domestic scientific fields as well as internationally.

Candidates, prior to defending their thesis, are required to publish their work in a defined number of papers in internationally recognized, distinguished, peer-reviewed journals, conferences, domestic journals, etc.

The thesis completeness, originality and novelty are assessed at multiple stages of review by:

- Supervision and mentoring team
- Two internal reviewers nominated by Scientific Council
- Scientific council through pre-defense presentation

The thesis can be defended only after obtaining positive response during all stages of review.

8.4 Specialized Council/s periodically publishes reports on the development of the relevant fields.

The Specialized Council doesn't publish any report on the development of the relevant field, as there is no such practice set in Armenia, neither is there any statutory requirement.

The Specialized Council has a website and an archive of defended PhD theses, where one can find all the synopses of the defended PhD theses (<http://molbiol.sci.am/council042/archive>).

9. Internal quality assurance

HEI has an internal quality assurance system, which promotes continual improvement of all the processes of doctoral education.

Please analyze how the HEI promotes quality assurance culture for doctoral education.

9.1 There are well-established and publicly available policies and procedures for internal quality assurance of doctoral education.

There is no policy on internal quality education of doctoral education, except for QA standards developed by the ANQA within Veritas project. Nevertheless, all the regulations and procedures described above contribute to the formation of internal quality assurance of doctoral education at IBM.

9.2 The internal and external stakeholders of doctoral education are involved in the quality assurance processes.

The internal stakeholders (Young Scientists Council, Scientific Council, students, academic and administrative staffs) regularly hold meetings to discuss current affairs aimed at the quality assurance of all processes at IMB, including PhD programs. Being a primary employer of PhD degree holder in Molecular and Cellular Biology, IMB continuously undertakes efforts to ensure the quality of degree program.

9.3 HEI collects reliable information on the implemented processes through feedback mechanisms, which is evaluated for the improvement of the goals and processes of doctoral education.

ISEC intends to introduce PhD student satisfaction survey, which will be mandatory for completion for all PhD students both in full-time and part-time modes. The questionnaire will be approved and put into practice in the fall semester of 2017.

9.4 The internal quality assurance system of doctoral education is periodically reviewed.

As there is no formal internal quality assurance system established for doctoral education at NAS RA, this statement is still irrelevant.

SWOT Analysis of Doctoral Program

	<p>External Opportunities (O)</p> <ol style="list-style-type: none"> 1. Availability of national and international funding 3. Extending cooperation network with foreign and national R&D institutions and industry 4. Increasing mobility of students and academic staff 4. Opportunities to publish research results in new scientific journals, including “Open access” journals 5. Participation in programs supporting young researchers 	<p>External Threats (T)</p> <ol style="list-style-type: none"> 1. Inadequate flexibility in revision of legislation governing the science and research-based education 2. Brain-drain of young and middle-age specialists 3. Limited state funding of PhD program 4. Overall weakness of university education of potential PhD applicants
<p>Internal Strengths (S)</p> <ol style="list-style-type: none"> 1. Clear strategic development program 2. Strategic planning of educational program development 3. Top-ranked research institution in Armenia 4. Exchange programs and collaboration with national and international institutions 5. Regular assessment efficacy of research and 	<p style="text-align: center;">S-O</p> <p style="text-align: center;">“Max-Max” Strategy</p> <p>Increase the visibility and internationalization of research and PhD programs</p> <p>Attracting human resources</p> <p>Further increase of research funding</p> <p>Increase of incoming mobility of students and supervisors from worldwide acknowledged research</p>	<p style="text-align: center;">S-T</p> <p style="text-align: center;">“Max-Min” Strategy</p> <p>Attractive opportunities for research continuation at the Institute</p> <p>Opportunities for employment in corresponding industry in Armenia</p> <p>Usage of mobility to accelerate doctoral program accomplishment</p> <p>Organization of intensive</p>

educational activities	centers	professional training courses provided by supervisors and international partners in place
<p>Internal Weaknesses</p> <p>(W)</p> <p>1. No mechanisms and procedures set in place to ensure development, approval, monitoring and periodic review of doctoral program with an active involvement of internal and external stakeholders.</p> <p>2. No periodical analyses of the effectiveness of applicants' assessment system are conducted.</p> <p>3. Limited internal financing</p> <p>4. No mechanisms in place for the evaluation of the effectiveness, applicability and availability of resources have been developed.</p> <p>5. No mechanisms have set that ensure quality of the student services and doctoral candidates are involved in the quality assurance practices.</p> <p>6. No internal QA has been developed</p>	<p style="text-align: center;">W-O</p> <p style="text-align: center;">“Min-Max” Strategy</p> <p>Adoption of best practices from the field/program specific mechanisms employed at collaborating institutions and benchmarking</p> <p>Involvement of external stakeholders in periodic review of doctoral programs based on the need assessment</p> <p>Foster the international fund raising by promoting joint research program implementation</p> <p>Training of academic staff in efficient supervision of PhD candidates</p> <p>Increasing the contribution of PhD students in the institutional research outcomes</p>	<p style="text-align: center;">W-T</p> <p style="text-align: center;">“Min-Min” Strategy</p> <p>Development and implementation of mechanisms and procedures to ensure development, approval, monitoring and periodic review of doctoral program with an active involvement of internal and external stakeholders</p> <p>Development of internal QA for doctoral programs</p>