

# **NATIONAL ACADEMY OF SCIENCES OF ARMENIA**

## **INSTITUTE OF MOLECULAR BIOLOGY**

### **Strategic Plan of “Molecular and Cellular Biology” PhD Program**

#### Background

The National Academy of Sciences of the Republic of Armenia is the highest self-governing scientific organization founded in the Republic of Armenia. With its special status it organizes, performs and coordinates fundamental and applied research required for knowledge-based economy, social and cultural development. The Academy unites 34 research organizations, scientific-technological centers and other organizations.

Main directions and issues of the Academy’s activities are organization, development and coordination of fundamental and applied research, as well as preparation of highly qualified scientific and pedagogical human resources through Master’s degree programs, PhD programs, and Doctoral Studies (corresponds to Habilitation in several EU countries, e.g. Germany).

The Institute of Molecular Biology (IMB) of the National Academy of Sciences of the Republic of Armenia (NAS RA) was founded in 1966 to promote the development of molecular biology in Armenia. Current research activities of IMB are focused on investigation of regulatory mechanisms of cell activity and its alterations in a number of pathologic conditions including autoimmune, autoinflammatory, cerebrovascular, infectious, cancer and psychiatric disorders.

IMB comprises 18 research units (11 laboratories and 7 groups), and 3 educational units. Three laboratories and 4 research groups are included in the Department of Applied Molecular Biology. IMB also harbors Institutional Scientific Council, Young Scientists Council and Ethics Committee. Institutional supporting units include Sequencing Center, Human DNA Samples Bank, Cell Line Collection, Animal Facility and Library.

## 1. INSTITUTIONAL STRATEGIES AND POLICIES

An important activity of IMB is the participation in educational processes and preparation of skilled and experienced researchers who will contribute to the development of knowledge-based economy in Armenia and worldwide. These activities are clearly stated in the Institute's statutes. The mission of IMB in the field of Master and PhD education is to offer high-quality, clearly defined degree programmes capable of fulfilling the needs of prospective students as well as taking into account needs of the labour market worldwide.

Currently, IMB offers PhD programs in Molecular and Cellular Biology, as well as Genetics, Master's degree program in Molecular and Cellular Biology, training courses in Bioengineering and Bioinformatics. In addition, workshops, summer schools and seminars are regularly organized by IMB staff.

Within the institute, strong research environments and mechanisms to enhance the quality of doctoral programs have been built and are maintained continuously. Moreover, the PhD programs at IMB are the successful starting points for future career development in industry or academia.

Though IMB has recorded huge advance in increasing the quality of PhD education, several strategic actions should be implemented in order to put these efforts at more formal levels. The steps here should mainly include development, formalization and dissemination of regulations and guidelines in doctoral programs.

Career development issues are especially important for doctoral programs at IMB. In Armenia the labor market is limited, thus special focus on international career opportunities is highly required.

Current situation	Steps to implement	Indicators
PhD program is implemented according to the regulations, guidelines and the decrees of competent governmental bodies. No complete set of internal regulations, handbook and codebooks are available.	Development of PhD program handbook	Developed documents approved by Scientific Council and publicly available
	Development of PhD program codebook	
	Provide prospective candidates and supervisors with the detailed	Links to webpages of relevant governmental bodies.

	and comprehensive information on PhD study procedures	All documents should be in Armenian and English
	Develop and maintain career opportunity directory for prospective students. This should include local and international job announcements	Directory will be available

## 2. ORGANIZATION AND STRUCTURE

The PhD education procedures are performed through concerted activities of several structures acting both within IMB and the Academy. The International Scientific-Educational Center (ISEC) is in charge of organizing admission procedures in line with the regulations and decrees of competent governmental bodies. The Center is also in charge of the educational unit of PhD program, while Scientific Secretary and Scientific Council of the IMB provide the appropriate support for the enrolment procedures, selection of mentors and research topics, as well as evaluation of study progress and completion. All documents are available at: [http://isec.am/index.php?category\\_id=4&blog\\_id=&lang=eng](http://isec.am/index.php?category_id=4&blog_id=&lang=eng).

## 3. RESOURCES AND FUNDING

IMB has 18 research units (11 laboratories and 7 groups), and 3 educational units. Three laboratories and 4 research groups are included in the Department of Applied Molecular Biology. IMB also has an Institutional Scientific Council, Young Scientists Council and Ethics Committee. Institutional supporting units include Sequencing Center, Human DNA Sample Bank, Cell Line Collection, Animal Facility and Library. The detailed information on the research activities of individual groups can be found at <http://molbiol.sci.am/resunits>.

The Academy operates based on combining the principles of state governance and self-governance and carries out fundamental and applied research in the most important directions of biomedical sciences. It coordinates fundamental studies in the country implemented through budget funding.

The basic activities of IMB are supported by the Armenian government through infrastructure preserving projects as well as thematic grant projects of SCS MES RA. A significant part of the budget is formed

through collaborative projects funded by international agencies. The complete funding sources as well as the list of ongoing projects can be found at <http://molbiol.sci.am/rdprojects>.

IMB encourages the mobility of “potential” 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.

The collaborative network of the IMB includes over 15 well-known international scientific centers worldwide. The list of partners abroad and in Armenia can be found at <http://molbiol.sci.am/collaboration>.

Current situation	Steps to implement	Indicators
Funding is considered as an important factor for successful implementation of PhD programme. The PhD students are encouraged to apply for grants.	Secure resource and funding for successful implementation of PhD program	Number of projects with secured funding for PhD students
		Number of collaborations with access to infrastructure needed for implementation of PhD program

#### 4. EDUCATIONAL OBJECTIVES AND COMPETENCES

The Academy prepares highly qualified scientific-pedagogical specialists through Master’s Studies, PhD Studies, Doctoral Studies as well as external PhD Studies on the basis of RA NAS facilities and equipment.

**Creation of new and original knowledge is the core component of the doctoral education.**

The Academy therefore supports the skills and abilities, which are as follows:

**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 are mandatory); 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 organization of seminars and/or other relevant events by the researcher's initiative;
- Promotion by the Academy in the ability of providing clear communication and presentation skills via special course on communication skills during the course of study;
- Taking lectures: researchers are required to obtain academic and paper writing skills thus strengthen 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 strengthen 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**

At the end of the education, PhD candidates should:

Have written and performed new knowledge through original research with sufficient quality to encompass the review by peers, which guarantee that the research is at the forefront of the discipline and is worth of being published;

Have acquired and understood a body of knowledge that is in the avant-garde of the academic discipline;

Be able to conceptualize, design and implement a project to generate new knowledge, apply or have the understanding of a discipline, and adjust the design based on unforeseen problems;

Have reached a detailed understanding of techniques to carry out the research.

#### 5. ADMISSION POLICY

##### **Admission of local students**

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

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

Submission of documents for a full-time PhD programme starts in May in line with the number of PhD student positions allotted and schedule defined by the RA Ministry of Education and Science. PhD applicants submit their documents to the PhD Studies Department at ISEC NAS RA, while professional examinations are held within the first ten days in June.

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

The list of the documents to be submitted is laid down in the internal regulation of ISEC NAS RA.

Professional exams are held in the relevant research organizations of the Academy.

**Admission of foreign students**

The admission of the foreign students is carried out in line with Education and Science Minister’s decree 629 N ‘On Admission of Foreign Applicants to the Higher Education Institutions in the Republic of Armenia’ dated on 06 July 2007.

All the governmental resolutions, decrees and internal regulations regulation admission process at the Academy can be found on the website of ISEC at [http://isec.am/index.php?category\\_id=4&blog\\_id=&lang=arm](http://isec.am/index.php?category_id=4&blog_id=&lang=arm)

The state regulations on admission policy provide the basic criteria to ensure objective evaluation and selection of candidates. However, several key issues are still present and the development of internal regulations at IMB is needed. While full-time PhD positions are limited and regulated by governmental decrees, IMB may have almost unlimited external PhD positions for local and foreign students. Thus, attractive procedures and measures should be implemented to increase the number of PhD students at IMB through this channel. The number of PhD positions and prospective study topics should be substantiated and realistic as well as be supported by resources, funding and qualified supervisors.

Current situation	Steps to implement	Indicators
Announcement in “Gitutyun” and “Hayastani Hanrapetutyun” newspapers.	Wider dissemination of information about PhD opportunities at IMB	Announcements on available positions at IMB and ISEC webpages, scientific social networks
Number of PhD positions is allotted by governmental bodies.	Development of criteria to select annual number of PhD positions to fulfill	Regulations on evaluation of PhD students requests
		Number of foreign and local external PhD students
Bias towards males entering PhD studies.	Ensure gender-equality during admission procedure	Number of male and female students

## 6. CURRICULUM

### Duration of PhD PROGRAM (PhD STUDIES)

The duration of a full-time PhD program is 3 years and part-time is 4 years. The PhD program is implemented according to PhD student's individual study program adhering to the requirements laid down in the regulations.

The program basis is 180 ECTS credits of scientific-research workload defined for the PhD qualification level by RA Law. In case of full-time education one academic year is equal to 60 credits, and 45 credits for part-time education. Full-time student's weekly load is equal to 1.5 credits (60 credits / 2 terms / 20 weeks = 1,5) or 45 hours, and 1 credit is equal to 30 hours.

The educational component (courses) equals to 58 credits, and the research component is 122 credits. The program contains 1-6 credited workload courses and educational and research modules, as well as research work which equals to 110 credits.

### STRUCTURE OF PhD PROGRAM

educational part of the program consists of *general courses and professional courses, internships and attestation*. The *general courses* serve to ensure and complement soft skills needed for the PhD qualification. The *professional courses* ensure PhD candidate's professional knowledge and skills. *Internships* ensure increase in researcher's scientific-pedagogical skills.

*General courses equal to 20 credits*. The courses aim to form transferable competences for PhD students. *General courses* consist of 5 mandatory courses and 2 elective courses each from 1 to 6 ECTS credit workload.

*Professional courses* include three courses (12 credits) and 2 professional examinations each equals to 5 credits (total of 10 credits).

*Internships* are equal to 10 ECTS credit workload, out of which 6 can be research internships and the rest must be pedagogical (teaching). *Internship* means 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.

Final Attestation is equal to 6 credits and serves as a basis to allow PhD student to a public defense.



### Final Program Requirements

Upon completion of the program, PhD student must score 150 credits in order to get a PhD qualification. Those credits include research and educational components of his/her program (including final attestation - 6 credits).

The educational part of the individual study program (including also the attestations) must be equal to ECTS 58 credits, out of which 20 are obtained from general courses, 22 from professional courses, and the rest 16 - from internships and final attestation.

The research part of the program must be equal up to 92 credits, out of which 12 credits must be obtained from scientific seminars and participation into scientific-research works, and the rest 80 credits from self (autonomous) research work and final dissertation preparation.

The PhD degree is awarded after final successful attestation by the appropriate state qualification committee (Supreme Certifying Committee (SCC)).

## 7. MENTORING

As a rule, a scientific supervisor should hold a degree of Doctor of Sciences (Habilitation) or Candidate of Sciences (PhD), if s/he has the permission of RA SCC. Doctors of Sciences in the respective field and also Candidates of Sciences who are allowed by RA SCC to mentor a PhD student can be appointed as a scientific supervisor.

A co-supervisor might also tutor a PhD candidate in doing research in the related fields. To get a mentoring permission, it is required to submit RA SCC the application of the Head of relevant research organization, the list of published research papers and an extract from the minutes of the scientific council meeting. RA SCC makes a decision within one month after the submission of the documents. PhD mentoring permission is given to candidates who have at least 30 published research articles covering respective topic.

A scientific supervisor is allowed to simultaneously mentor not more than five PhD students and PhD degree seekers.

The Supervisor is chosen by IMB Scientific council 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 project 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.

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

## 8. PhD THESIS AND ORIGINAL RESEARCH

The 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 published 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.

After the thesis is released for the Institute the candidate follows the procedures defined by Supreme Certifying Committee RA.

## 9. STUDENT ASSESSMENT

Currently no regulations are present for the assessment of student's feedback on his/her study program.

While the measures for student assessment include annual attestation and assessment by supervisor, no information is currently collected from the student's side.

Current situation	Steps to implement	Indicators
Student assessment includes annual attestation and assessment by supervisor	Development of evaluation forms for assessment of PhD study course	Annual assessments by students

## 10. MOBILITY

IMB is integrated in the international research area establishing close partnership with internationally acknowledged research and educational centers and units worldwide, 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 at 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.

Each student has to report back about the activities and results of his travel during Scientific Council meeting upon his return.

Current situation	Steps to implement	Indicators
Rate of conference participation of PhD students is high	Promote conference participation of PhD students during their study period	Number of PhD students participated at local and international conferences
Short-term research visits are encouraged	Promote short-term research projects of PhD students during their study period	Number of PhD students who performed short-term research project abroad
Long-term research visits and joint PhD projects have difficulties to be organized		Evaluation of the effectiveness of mobility by the number of publications and their relevance to the PhD topic

## 11. EVALUATION

Quality assurance and management procedures are essential for the successful implementation of PhD programs. Currently no formal institutional guidelines are available for adequate evaluations procedures. These procedures and guidelines should be developed to ensure systematic and continuous evaluation.

Current situation	Steps to implement	Indicators
No formal institutional guidelines are available	Development of PhD program evaluation guidelines and forms	Developed guidelines
	Evaluation of ongoing and completed programs by Scientific Secretary	Report by Scientific Secretary on the results of evaluation
		Publicly available reports on the IMB webpage