Mahidol University
Institute of Molecular Biosciences

# Program Specification
# Doctor of Philosophy Program in Molecular Genetics and Genetic Engineering
# (International Program)

Revised Program 2018

**1. Program Title** Doctor of Philosophy Program in Molecular Genetics and Genetic Engineering (International Program)

**2. Name of the final award**

Full name : Doctor of Philosophy (Molecular Genetics and Genetic Engineering)
Abbreviation : Ph.D. (Molecular Genetics and Genetic Engineering)

**3. Responsible Units**

3.1 Awarding Institution: Faculty of Graduate Studies, Mahidol University
3.2 Teaching Institution: Institute of Molecular Biosciences, Mahidol University

**4. Status of the Program and Program Accreditation**

4.1 This program was revised in 2018.
4.2 This program has been implemented since the first semester of academic year 2018.
4.3 This program was endorsed by the Mahidol University Academic Committee in the 4/2018 meeting on 14th February 2018 and approved in the 532th meeting of the Mahidol University Council on 16th May 2018.

**5. Philosophy of the Program**

The Ph.D. program philosophy is to produce graduates with in-depth knowledge and professional skills in Molecular Biology/Genetics and related fields and ability to drive innovation for the benefit of society and mankind.

**6. Expected learning outcomes**

Upon graduation, the graduates should be able to

6.1 Formulate and test hypothesis from substantial body of knowledge by independently conducting research in Molecular Biology.
6.2 Originate new insights in Molecular Biology and research output at international standard.
6.3 Disseminate novel concepts and/or innovative ideas in Molecular Biology to international scientific community.
6.4 Demonstrate proficiency in scientific integrity including ethical responsibilities and safety practices as appropriate.
6.5 Master professional and interpersonal skills for lifelong learning and career development.

**7. Admission Requirements**

7.1 **Plan 1** (For students with Master's degree with research experience and no course work is required)
7.1.1 holding a Master's degree in Molecular Genetics and genetic Engineering or related fields in biological sciences with a GPA of no less than 3.50 and
7.1.2 being the first author of a publication in a peer-reviewed international journal **or** having at least two-year research experience in Molecular biology or related fields
7.1.3 having an English Proficiency examination score as the requirement of Faculty of Graduate Studies
7.1.4 Applicants who do not meet any of the above requirements may be considered by the Program Director and the Dean of the Faculty of Graduate Studies.

7.2 **Plan 2** (For students with Master's or Bachelor's degree and both course work and research are required)
7.2.1 holding a Master's degree in Molecular Genetics and Genetic Engineering or related fields in biological sciences with a GPA of no less than 3.50 **or**
7.2.2 holding a Bachelor's degree in biological sciences or medical sciences with a GPA of no less than 3.50
7.2.3 having an English Proficiency examination score as the requirement of Faculty of Graduate Studies
7.2.4 Applicants who do not meet any of the above requirements may be considered by the Program Director and the Dean of the Faculty of Graduate Studies.

**8. Selection Process**

8.1 Applicants must pass an English proficiency test (TOEFL/IELTS) as required by the Faculty of Graduate Studies.

8.2 Applicants who have qualified English score are selected for an interview conducted in English by the program's faculties. Justification is based on five criteria: English proficiency, knowledge, research skills, intelligence and personality.

8.3 Final judgment will be made under the consideration of the Administrative Program Committee in concurrence with the Dean of Faculty of Graduate Studies, Mahidol University.

**9. Educational Management System**

9.1 System:
Semester; 15 weeks per semester

9.2 Credit assignment:
Lecture consuming 1 hour per week (or 15 hours per semester) is equal to 1 credit hour.
Laboratory consuming 3 hours per week (or 45 hours per semester) is equal to 1 credit hour.

**10. Subject benchmark statements**

To ensure that on graduating with the Doctor of Philosophy in Molecular Genetics and Genetic Engineering, our graduates will demonstrate both academic and research excellence in molecular biology at international standard. Our program is benchmarked against the "Standard for Doctoral Degrees in the Molecular Biosciences" guidelines (2011) of the International Union of Biochemistry and Molecular Biology (IUBMB). Accordingly, the expected learning outcomes of our graduate programs aligned well with the IUBMB-recommended guidelines.

**11. Program Structure**

| | | | |
|---|---|---|---|
| **11.1 Plan 1** | **For students with Master's degree** | | |
| | Dissertation | 48 | credits |
| **11.2 Plan 2.1** | **For students with Master's degree** | | |
| | Required courses | 6 | credits |
| | Elective courses no less than | 6 | credits |
| | Thesis | 36 | credits |
| | Totally no less than | 48 | credits |
| **11.2 Plan 2.2** | **For students with Bachelor's degree** | | |
| | Required Courses | 21 | credits |
| | Elective Courses no less than | 5 | credits |
| | Dissertation | 48 | credits |
| | Totally no less than | 74 | credits |

**11.3 Courses offered**

**Plan 2.1 For students with Master's degree**

| **Required Courses** (6 credits) | Credits (lecture-lab-self-study) |
|---|---|
| MBMG 504 Advanced Research Skills in Molecular Biology | 3 (0-9-3) |
| MBMG 621 Doctoral Seminar in Molecular Genetics and Genetic Engineering | 1 (1-0-2) |
| MBMG 622 Doctoral Research Seminar in Molecular Genetics and Genetic Engineering | 1 (1-0-2) |
| MBMG 623 Advanced Doctoral Research Seminar in Molecular Genetics and Genetic Engineering | 1 (1-0-2) |

**Elective Courses** (no less than 6 credits)

| | | |
|---|---|---|
| MBMG 610 | Innovation in Research | 1 (1-0-2) |
| MBMG 614 | Analysis of Research Publications for Molecular Bioscience | 2 (0-6-2) |
| MBSB 501 | Systems Biosciences | 3 (3-0-6) |
| MBSB 603 | Molecular Diagnosis and Molecular Therapy | 2 (2-0-4) |
| SCBC 612 | Functional Genetics and Genomics | 2 (2-0-4) |

Note: In addition to elective courses mentioned above, a student may register other courses in international program offered by other faculties equivalent to graduate studies, Mahidol University or the ones offered by other universities according to the student's interest with the approval of the curriculum committee or the advisor.

**Dissertation**

| | | |
|---|---|---|
| MBMG 699 | Dissertation | 36 (0-108-0) |

**Plan 2.2 For students with Bachelor's degree**

| **Required Courses** (21 credits) | | Credits (lecture-lab-self-study) |
|---|---|---|
| MBMG 500 | Essentials in Molecular Biology | 2 (2-0-4) |
| MBMG 504 | Advanced Research Skills in Molecular Biology | 3 (0-9-3) |
| MBMG 512 | DNA Engineering | 2 (1-2-3) |
| MBMG 513 | Gene Expression and Applications | 3 (2-2-5) |
| MBMG 514 | Protein Structure and Function | 3 (2-2-5) |
| MBMG 515 | Protein Technologies and Applications | 2 (1-2-3) |
| MBMG 516 | Cell Technologies and Applications | 3 (1-6-4) |
| MBMG 621 | Doctoral Seminar in Molecular Genetics and Genetic Engineering | 1 (1-0-2) |
| MBMG 622 | Doctoral Research Seminar in Molecular Genetics and Genetic Engineering | 1 (1-0-2) |
| MBMG 623 | Advanced Doctoral Research Seminar in Molecular Genetics and Genetic Engineering | 1 (1-0-2) |

| **Elective Courses** (no less than 5 credits) | | Credits (lecture-lab-self-study) |
|---|---|---|
| MBMG 610 | Innovation in Research | 1 (1-0-2) |
| MBMG 614 | Analysis of Research Publications for Molecular Bioscience | 2 (0-6-2) |
| MBSB 604 | Virus-Cell Interactions and Immunity | 3 (3-0-6) |
| SCBC 612 | Functional Genetics and Genomics | 2 (2-0-4) |
| SCID 500 | Cell and Molecular Biology | 3 (3-0-6) |
| SCID 518 | Generic Skills in Science Research | 1 (1-0-2) |

In addition to elective courses mentioned above, a student may register other courses in international program offered by other faculties equivalent to graduate studies, Mahidol University or the ones offered by other universities according to the student's interest with the approval of the curriculum committee or the advisor.

**11.4 Course Code Description**

The first two letters represent the abbreviated name of the Institute/Faculty

MB = Institute of Molecular Biosciences

SC = Faculty of Science

GR = Faculty of Graduate Studies

The last two letters represent the abbreviated name of responsible units

MG = Molecular Genetic and Genetic Engineering Program

SB = Systems Biosciences Program

BC = Department of Biochemistry

ID = Inter-departmental Course

**11.5 Research**

The program offers research projects in different topics such as:

- Molecular Medicine
- Molecular Biology for Agricultural and Industrial Applications
- Molecular Microbiology
- Bio-Energy Research
- Structural Molecular Biology
- Bioinformatics
- Multi-Omics
- Drug Discovery
- Genome Editing and Cell-Based Technology

**11.6 Study Plan**

**11.6.1 Plan 1**

| Year | Semester 1 | Semester 2 |
|---|---|---|
| 1 | (Qualifying Examination)<br>MBMG 898 Dissertation 8 (0-24-0)<br>**Total 8 credits** | MBMG 898 Dissertation 8 (0-24-0)<br>**Total 8 credits** |
| 2 | MBMG 898 Dissertation 8 (0-24-0)<br>**Total 8 credits** | MBMG 898 Dissertation 8 (0-24-0)<br>**Total 8 credits** |
| 3 | MBMG 898 Dissertation 8 (0-24-0)<br>**Total 8 credits** | MBMG 898 Dissertation 8 (0-24-0)<br>**Total 8 credits** |

***Notes:***

1. *Students may take some coursework upon the recommendation of the major advisor or the program committee, and must meet the assessment criteria of the course.*
2. *This study plan may include overseas research experience.*

**11.6.2 Plan 2.1 (For students with Master's degree)**

| Year | Semester 1 | Semester 2 |
|---|---|---|
| 1 | MBMG 504 Advanced Research skill in Molecular Biology 3 (0-9-3)<br>Elective course not less than 2 credits<br>**Total 5 credits** | MBMG 799 Dissertation 8 (0-24-0)<br>Elective course not less than 1 credit<br>**Total 9 credits** |
| 2 | (Qualifying Examination)<br>MBMG 621 Doctoral Seminar in Molecular Genetics and Genetic Engineering 1 (1-0-2)<br>MBMG 699 Dissertation 7 (0-21-0)<br>Elective course not less than 3 credits<br>**Total 11 credits** | MBMG 622 Doctoral Research Seminar in Molecular Genetics and Genetic Engineering 1 (1-0-2)<br>MBMG 699 Dissertation 7 (0-21-0)<br>**Total 8 credits** |
| 3 | MBMG 623 Advanced Doctoral Research Seminar in Molecular Genetics and Genetic Engineering 1 (1-0-2)<br>MBMG 699 Dissertation 7 (0-21-0)<br>**Total 8 credits** | MBMG 699 Dissertation 7 (0-21-0)<br>**Total 7 credits** |

**11.6.3 Plan 2.2 (For students with Bachelor's degree)**

| Year | Semester 1 | Semester 2 |
|---|---|---|
| 1 | MBMG 500 Essentials in Molecular Biology 2 (2-0-4)<br>MBMG 512 DNA Engineering 2 (1-2-3)<br>MBMG 513 Gene Expression and Applications 3 (2-2-5)<br>Elective course not less than 3 credits<br>**Total 10 credits** | MBMG 514 Protein Structure and Function 3 (2-2-5)<br>MBMG 515 Protein Technologies and Applications 2 (1-2-3)<br>MBMG 516 Cell Technologies and Applications 3 (1-6-4)<br>**Total 8 credits** |
| 2 | (Qualifying Examination)<br>MBMG 504 Advanced Research Skill in Molecular Biology 3 (0-9-3)<br>Elective course not less than 2 credits<br>**Total 5 credits** | MBMG 799 Dissertation 8 (0-24-0)<br>Elective course not less than 1 credit<br>**Total 9 credits** |
| 3 | MBMG 621 Doctoral Seminar in Molecular Genetics and Genetic Engineering 1 (1-0-2)<br>MBMG 799 Dissertation 10 (0-30-0)<br>**Total 11 credits** | MBMG 622 Doctoral Research Seminar in Molecular Genetics and Genetic Engineering 1 (1-0-2)<br>MBMG 799 Dissertation 10 (0-30-0)<br>**Total 11 credits** |
| 4 | MBMG 623 Advanced Doctoral Research Seminar in Molecular Genetics and Genetic Engineering 1 (1-0-2)<br>MBMG 799 Dissertation 10 (0-30-0)<br>**Total 11 credits** | MBMG 799 Dissertation 10 (0-30-0)<br>**Total 10 credits** |

**12. Graduation requirements**

To graduate and be awarded their degree, students must

**12.1 Plan 1**

12.1.1 Total time of study should not exceed the study plan.

12.1.2 Students must complete a 48 credits dissertation and pass the assessment of all courses recommended to register.

12.1.3 Students must meet the English Competence Standard of Graduate Students, Mahidol University defined by the Faculty of Graduate Studies, Mahidol University.

12.1.4 Students must participate in skill development activities of the Graduate Studies, Mahidol University.

12.1.5 Students must have two published research articles and/or manuscripts accepted for publication from part of the thesis work in international peer-reviewed journals before having the thesis examination

12.1.6 Students must pass the oral thesis defense examination and submit the thesis to the Faculty of Graduate Studies according to Mahidol University Regulations on Graduate Studies.

**12.2 Plan 2**

12.2.1 Total time of study should not exceed the study plan.

12.2.2 Students must complete the minimum credit requirement of coursework and thesis as follows:

- A minimum of 12 credits of coursework and 36 credits of thesis for students holding an M.Sc. degree.

- A minimum of 26 credits of coursework and 48 credits of thesis for students holding a B.Sc. degree.

12.2.3 Students must have a minimum GPA of 3.00.

12.2.4 Students must meet the English competence Standard of Graduate Students, Mahidol University defined by the Faculty of Graduate Studies, Mahidol University.

12.2.5 Students must participate in skill development activities of the Graduate Studies, Mahidol University.

12.2.6 Students must have at least one published research article and/or manuscript accepted for publication from part of the thesis work in international peer-reviewed journals before having the thesis examination. In case the student is awarded a scholarship, the number of research articles must be in line with the requirements of the funding sources.

12.2.7 Students must pass the oral thesis defense examination and submit the thesis to the Faculty of Graduate Studies according to Mahidol University Regulations on Graduate Studies.

**13. Job opportunities**

13.1 Academic staff in Molecular Genetics and relevant disciplines in the university
13.2 Researchers in research institutes, universities or private sectors
13.3 Biotechnology entrepreneurs