Course Syllabus
MBMG 504 Advanced Research skills in Molecular Biology
Academic year 2023

Course ID and Name: MBMG 504

Course coordinator: Assoc. Prof. Chalermporn Ongvarrasopone, Ph.D.
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Instructors:

1. Prof. Duncan Richard Smith, Ph.D.

2. Assoc. Prof. Panadda Boonserm, Ph.D.

3. Assoc. Prof. Saovaros Svasti, Ph.D.

4. Assoc. Prof. Sarin Chimnaronk, Ph.D.

5. Asst. Prof. Chalongrat Noree, Ph.D.

6. Asst. Prof. Duangrudee Tanramluk, Ph.D.

7. Asst. Prof. Poochit Nonejuie, Ph.D.

8. Asst. Prof. Sirirat Kumarn, Ph.D.

9. Asst. Prof. Suntaree Unhapipat, Ph.D.

10. Assoc. Prof. Chalermporn Ongvarrasopone, Ph.D.

Credits: 2 (1-2-3) (2 Credits)

Curriculum: Doctor of Philosophy Program in Molecular Genetics and Genetic Engineering (required course for students from B.Sc.)

Semester offering: First semester

Pre-requisites: None

Course learning outcomes:

At the end of the course, students are able to:

1. develop scientific integrity and ethical awareness in performing research

2. demonstrate their in-depth knowledge in molecular genetics and genetic engineering.

3. conduct experiments to acquire the advanced research skill in molecular biology.

4. develop critical thinking and interpersonal skills

5. demonstrate their abilities to manage scientific data statistically, to write the research proposal and perform an oral presentation.

Alignment of teaching and assessment methods to course learning outcomes:

Program learning outcomes	Course learning outcomes	Teaching methods	Assessment methods
PLO1 Demonstrate proficiency in scientific integrity including ethical responsibilities and safety practices as appropriate.	1. develop scientific integrity and ethical awareness in performing research	(1) Hands-on practice (2) Lab safety (3) Class discussion	(1) Assessment of responsibility for assigned work. (2) Lab performance (3) In-class discussion
PLO2 Illustrate in-depth knowledge and innovative concepts in molecular genetics and genetic engineering.	2. demonstrate their in-depth knowledge in molecular genetics and genetic engineering.	(1) Proposal writing (2) Class discussion	(1) Written proposal (2) Oral presentation
PLO3 Integrate advanced theoretical insights in molecular genetics and genetic engineering and conduct systematic research to broaden knowledge landscape of the field.	3. conduct experiments to acquire the advanced research skill in molecular biology.	(1) Hands-on practice (2) Class discussion	(1) Direct observation (2) Lab performance
PLO4 Develop effective professional and interpersonal skills for apparent coherence among academic and non-academic communities.	4. develop critical thinking and interpersonal skills	(1) Hands-on practice (2) Class discussion	(1) Lab performance (2) In-class discussion
PLO5 Disseminate novel concepts and/or innovative ideas in molecular genetics and genetic engineering using effective information and communication technology, numerical and statistical methods to global community.	5. demonstrate their abilities to manage scientific data statistically, to write the research proposal and perform an oral presentation.	(1) Experimental data presentation, analysis and discussion (2) Class discussion	(1) Written proposal (2) Oral presentation (3) Quiz

Course description:

The course is designed for students to develop research skill, scientific data management, scientific integrity, and ethical awareness in molecular biology research. Students will learn how to develop research proposal and conduct the experiments under the supervision of their tentative advisors. The preliminary data should be included. Students will submit the research proposal and have an oral presentation at the completion of the course.

Course schedule:

Date: Monday or Wednesday

Time: either in the morning or in the afternoon (See the schedule in more detail)

Rooms A401 / on-site (Lecture), Institute of Molecular Biosciences, Mahidol University.

Date/time	Topics/Details	Number of Hours	Class Activity/Teaching Media / Room	Lecturers
Aug. 23th 10.00-12.00	Orientation / How to read scientific article?	1	Lecture	Chalermporn
Aug. 28th ** 13.30-15.30	Grant proposal development	2	Lecture (C405)	Saovaros
Sept. 4th ** 9.00-12.00	Scientific integrity/ research ethics (Human, animal, and biosafety)	3	Lecture (C405)	Saovaros
Sept. 11th 10.00-12.00	Scientific writing	2	Lecture (A401)	Duncan
Sept. 18th 10.00-12.00	Scientific presentation (1)	2.	Lecture (A401)	Sirirat
Sept. 25th 10.00-11.00	Scientific presentation (2)	1	Lecture (A401)	Sirirat
Oct 2nd 10.00-11.00	Data management	1	Lecture (A401)	Chalermporn
Oct 3rd ** 9.00-12.00	Statistical analysis	3	Lecture (A401)	Suntaree
August 23rd – December 6th (Week 1-15)	Research practice	30		
November 29th	Submit proposal			Evaluateded by Aj.Chalongrat / Chalermporn
Dec 13th 9.00-12.00 a.m. 1.00-3.00 p.m.	Students oral presentation		On-site presentation / reflection AAR (A401)	All

Assessment Criteria:

Assessment Criteria	Assessment Method	Scoring Rubric
Laboratory performance (Ability to design the experiments, lab practical skill, responsibility, ethicality, attendance) (40%)	(1) Direct observation (2) Short presentation (3) In-class discussion	(1) Ability to follow procedure or to design a procedure for experiment (2) Use of equipment (3) Working area and safety
Proposal report (30%) (include data management and analysis)	(1) Reports	(1) Writing style (2) Report sending (3) Presentation of data (4) Data analysis and conclusion
Oral presentation (30%)	(1) Seminar content (10%) (2) Presentation style (10%): organization/ flow of the talk, slide quality, English proficiency, ethical awareness. (1) Answering questions (10%): Knowledge, critical thinking	(1) Presentation

Student's achievement will be graded using symbols: A, B+, B, C+, C, D+, D and F based on the criteria as follows:

Percentage	Grade	Description
80–100	A	Excellent
75–79	B$^+$	Very Good
70–74	B	Good
65–69	C$^+$	Fairly Good
60–64	C	Fair
55–59	D$^+$	Poor
50–54	D	Very Poor
0–49	F	Fail

Lab Performance Evaluation Rubric				
Criteria	**Excellent (4)**	**Good (3)**	**Satisfactory (2)**	**Needs to Improve (1)**
1. Ability to Follow Procedure or to Design a Procedure for Experiment (25 %)	Actively followed the instructions in the procedure with no assistance. Showed ability to perform additional experiments or tests beyond what was required in the procedure.	Followed the instructions in the procedure with little or no assistance. If the procedure was not provided, the student was able to determine an appropriate experiment to satisfy the lab objectives.	Had difficulty with some of the instructions in the procedure and needed clarification from the instructor or lab partner. If the procedure was not provided, the student needed some guidance about experiments to perform to satisfy the lab objectives.	Had difficulty reading the procedure and following the directions. Several mistakes were made during the experiment. If the procedure was not provided, student was incapable of designing a set of experiments to satisfy the given lab objectives.
2. Use of Equipment (10 %)	Showed proper techniques for handling tools and lab equipment without error.	Showed proper techniques for handling tools and lab equipment with a few minor errors.	Showed adequate care for handling tools and lab equipment with some minor errors.	Showed improper techniques for handling with some major errors.
3. Working Area and Safety (5 %)	Lab was carried out with full attention to relevant safety procedures & directions. No incident occurred. Outstanding job cleaning up working area, tools and equipment. Lab tools were organized and stored with care.	Lab was generally carried out with attention to relevant safety procedures & directions. No incident occurred. Good job on cleaning up working area, tools and equipment. Lab tools were properly stored.	Lab was carried out with some attention to relevant safety procedures & directions. A few incidents occurred. Had to be reminded to clean up area and equipment. Sometimes showed disorganized storage of lab tools.	Safety procedures were ignored. Did not follow directions. Several incidents occurred. Did not clean up area and equipment after working. Showed disorganized storage of lab tools.
Total (40 %)	**Total points earned =**			

Proposal Report Evaluation Rubric				
Criteria	Excellent (4)	Good (3)	Satisfactory (2)	Needs to Improve (1)
1. Writing Style (4 %)	Report was neat and well organized with minimum spelling error.	Report was neat and appropriately organized with a few spelling errors.	Report was somewhat neat and organized with some spelling errors.	Report was disorganized with many spelling errors.
2. Report Sending (1%)	Report was sent on time.	Report was sent one day late.	Report was sent two days late.	Report was sent more than two days late.
3. Presentation Of Data (15%)	Experimental data was clearly presented with tables, diagrams, pictures or graphs that effectively present the experimental data. Showed clear detail of results and graphical data were labeled accurately.	Experimental data was presented in an appropriate format with only a few minor errors or omissions. Showed clear detail of results and graphical data were labeled accurately.	Experimental data was presented in an appropriate format but some significant errors were noticed. Some tables, graphical data could be better organized. Some units, labels, and titles were missing.	Experimental data was poorly presented. Graphs or tables were poorly constructed with several errors. Data was missing or incorrect. Some units, labels, and titles were not included.
4. Data Analysis and Conclusion (10%)	Reasonable scientific explanations for the results were discussed and logically analyzed. Conclusion was well written with a complete answer to the question or hypothesis. Provided description of what was learned, possible sources of error, good suggestions for improving the experiment and application.	Scientific explanations for the results were given. Conclusion was appropriately written with a possible answer to the question or hypothesis. Provided description of what was learned, possible sources of error, suggestions for improving the experiment and application.	Scientific explanations for the results were given but not complete or accurate. Conclusion was written with inaccurate answer to the question or hypothesis. Description of what was learned, possible sources of error, suggestions for improving the experiment and application were missing.	Scientific explanations for the results were given but not complete or accurate. Conclusion was poorly written with inaccurate answer to the question or hypothesis. Description of what was learned, possible sources of error, suggestions for improving the experiment and application were missing.
Total (30 %)	**Total points earned =**			

Oral presentation: 30%

    Presentation (total 30 min): Giving presentation: 15 min, answering questions: 15 min
    Presentation evaluation:

- Seminar content (10%)
- Presentation style (10%): organization/ flow of the talk, slide quality, English proficiency, ethical awareness.
- Answering questions (10%): Knowledge, critical thinking

Date revised: August 10th, 2023