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

Course ID and Name: MBMG 504 Advanced Research skills in Molecular Biology

Course coordinator: Assoc. Prof. Chalermporn Ongvarrasopone, Ph.D.
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Instructors:
1. Prof. Duncan Richard Smith, Ph.D.
2. Assoc. Prof. Kanokporn Triwitayakorn, Ph.D.
3. Asst.Prof. Chalongrat Noree, Ph.D.
4. Assoc. Prof. Chalermporn Ongvarrasopone, Ph.D.

Credits: 3 (0-9-3) (3 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. conduct experiments to acquire the advanced research skill in molecular biology.
2. demonstrate their abilities to present the research by writing the proposal and giving an oral presentation.
3. develop critical thinking, scientific integrity and ethical awareness in performing research

Alignment of teaching and assessment methods to course learning outcomes:

Course learning outcomes	Teaching methods	Assessment methods
1. conduct experiments to acquire the advanced research skill in molecular biology.	(1) Hands-on practice (2) Class discussion	(1) Direct observation (2) Lab performance
2. demonstrate their abilities to present the research by writing the proposal and giving an oral presentation.	(1) Experimental data presentation and discussion	(1) Reports (2) Oral presentation
3. develop critical thinking, 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

Course description:

The course is designed for students to develop research skill, critical thinking, scientific integrity, and ethical awareness. Students will perform the experiments under the supervision of their tentative advisors. In the meantime, they will start to write the pre-thesis proposal which includes the preliminary data and have an oral presentation at the completion of the course.

Class Schedule:
Course outlines:
Course orientation: August 21st, 2023: How to write a proposal? Scientific integrity
Practical weeks: August 21st, 2023 – October 9th, 2023
Class meeting: September 21st, 2023 at 1.00-3.00 p.m.:
Review literature, proposal development
Research update, Ethical awareness in scientific writing and presentation
Submission proposal report: October 9th, 2023
Oral presentation: October 18th, 2023 at 1.00-2.30 p.m.

Assessment Criteria:

Assessment Criteria	Assessment Method	Scoring Rubric
Laboratory performance (Ability to design the experiments, lab practical skill,	(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

Assessment Criteria	Assessment Method	Scoring Rubric
responsibility, ethicality, attendance) (40%)		(3) Working area and safety
Proposal report (30%)	(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. (3) 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