

| | | |
|--|--|------------------------|
| Philadelphia University |  PHILADELPHIA UNIVERSITY <small>THE WAY TO THE FUTURE</small> | Approval date: |
| Faculty: Science | | Issue: |
| Department: Biotechnology and Genetic Engineering | | Credit hours: 1 |
| Academic year: 2022/2023 | | Bachelor |

Course information

| Course# | Course title | Prerequisite |
|--|---------------------|--------------------------|
| 0240232 | Genetics Lab | Genetics |
| Course type | | Class time |
| <input type="checkbox"/> University Requirement <input type="checkbox"/> Faculty Requirement <input checked="" type="checkbox"/> Major Requirement <input type="checkbox"/> Elective <input checked="" type="checkbox"/> Compulsory | | Sun (13:10-16:00) |
| | | Room # |
| | | 2903 |

Instructor Information

| Name | Office No. | Phone No. | Office Hours | E-mail |
|----------------------|-------------|-------------|---|-------------------------------------|
| Ahmad Ghuneim | 2823 | 2491 | Sun, Tue, Thr (09:30-10:30) Sun, Mon (12:00-13:00) | aghuneim@philadelphia.edu.jo |

Course Delivery Method

| Course Delivery Method | | | |
|---|-------------|--------------|-------------|
| <input checked="" type="checkbox"/> Physical <input type="checkbox"/> Online <input type="checkbox"/> Blended | | | |
| Learning Model | | | |
| Precentage | Synchronous | Asynchronous | Physical |
| | | | 100% |

Course Description

This module is a major requisite for students of biotechnology and genetic engineering, and it presented in lectures. Its content focus on basic Mendelian principles, isolation and characterization of the DNA, mutagenesis and tests used for detecting mutagens.

Course Learning Outcomes

| Number | Outcomes | Corresponding Program outcomes |
|---------------------|--|--------------------------------|
| Knowledge | | |
| K1 | Learn how to deal with <i>Drosophila</i> in laboratory | Kp4 |
| K2 | Solve chi-square problems | Kp4 |
| K3 | Study the isolation of DNA and measure its concentration | Kp3 |
| K4 | Understand the electrophoresis technique | Kp3 |
| K5 | Understand mutation and do Experiment related to it | Kp4 |
| K6 | Identify principle of Ames test | Kp4 |
| Skills | | |
| S1 | Improve Practical skills such as ability of dealing with <i>Drosophila</i> to study Mendel's law of genetics, DNA extraction, the ability to obtain record, collate and analyze information in the laboratory. | Sp1, Sp2 |
| S2 | Gain interpersonal and Team work skills by getting opportunities to Work productively with others in the laboratory, discussion of results with supervisor and brain storming. | Sp5 |
| Competencies | | |
| C1 | Demonstrate critical thinking skills, utilize a wide range of information sources and Analyzing information in the laboratory. | CP2 |
| C2 | Perform analytical lab work, communicate and interpret scientific ideas and principles through oral presentations and written reports. | CP3 |
| C3 | Demonstrate professional and ethical conduct. | CP4 |

Learning Resources

| | |
|-----------------------|---|
| Course textbook | |
| Supporting References | Lab Sheets will be provided during course |
| Supporting websites | |
| Teaching Environment | <input type="checkbox"/> Classroom <input checked="" type="checkbox"/> laboratory <input type="checkbox"/> Learning platform <input type="checkbox"/> Other |

Meetings and subjects timetable

| Week | Topic | Learning Methods | Tasks | Learning Material |
|------|-------------------------------------|---|------------------|-------------------|
| 1 | Introduction to genetics laboratory | Lecture, Experiment, collaborative learning | | Lab sheet |
| 2 | Meeting the fruit fly | Lecture, Experiment, collaborative learning | Report 1 | Lab sheet |
| 3 | Observation of Drosophila mutant | Lecture, Experiment, collaborative learning | Quiz 1 | Lab sheet |
| 4 | Monohybrid crosses | Lecture, Experiment, collaborative learning | Report 2 | Lab sheet |
| 5 | Dihybrid cross and chi-square test | Lecture, Experiment, collaborative learning | Quiz 2+Report 3 | Lab sheet |
| 6 | Cell division | Lecture, Experiment, collaborative learning | Report 4 | Lab sheet |
| 7 | Midterm Exam | Lecture, Experiment, collaborative learning | | Lab sheet |
| 8 | Isolation of DNA | Lecture, Experiment, collaborative learning | | Lab sheet |
| 9 | Measuring the concentration of DNA | Lecture, Experiment, collaborative learning | Report 4+ Quiz 4 | Lab sheet |
| 10 | Agarose gel electrophoresis | Lecture, Experiment, collaborative learning | | Lab sheet |
| 11 | Bacterial mutation | Lecture, Experiment, collaborative learning | Quiz 5+Report 5 | Lab sheet |

| | | | | |
|-----------|------------|--|--------|-----------|
| 12 | Ames test | Lecture, Experiment, collaborative learning | Quiz 6 | Lab sheet |
| 13 | Final exam | | | |

* includes: Lecture, flipped Class, project- based learning, problem solving based learning, collaborative learning

Course Contributing to Learner Skill Development

| |
|--------------------------------|
| Using Technology |
| Using computerized instruments |
| Communication skills |
| Working experiment as group |
| Application of concepts learnt |
| Doing Experiments |

Assessment Methods and Grade Distribution

| Assessment Methods | Grade Weight | Assessment Time (Week No.) | Link to Course Outcomes |
|-----------------------|--------------|----------------------------|-----------------------------------|
| Mid Term Exam | % 30 | 20-12-2021 | K1,K2,S1,S2,,C1,C2,C3 |
| Various Assessments * | % 30 | During course | K1,K2,K3,K4,K5,K6,S1,S2,,C1,C2,C3 |
| Final Exam | % 40 | 25-1-2022 | All |
| Total | %100 | | |

* includes: quiz, in class and out of class assignment, presentations , reports, videotaped assignment, group or individual projects.

Alignment of Course Outcomes with Learning and Assessment Methods

| Number | Learning Outcomes | Learning Method* | Assessment Method** |
|---------------------|--|----------------------|---------------------|
| Knowledge | | | |
| K1 | Learn how to deal with <i>Drosophila</i> in laboratory | Lecture | Quiz, Exam |
| K2 | Solve chi-square problems | Lecture | Quiz, Exam |
| K3 | Study the isolation of DNA and measure its concentration | Lecture | Quiz, Exam |
| K4 | Understand the electrophoresis technique | Lecture | Quiz, Exam |
| K5 | Understand mutation and do Experiment related to it | Lecture | Quiz, Exam |
| K6 | Identify principle of Ames test | Lecture | Quiz, Exam |
| Skills | | | |
| S1 | Improve Practical skills such as ability of dealing with <i>Drosophila</i> to study Mendel's law of genetics, DNA extraction, the ability to obtain record, collate and analyze information in the laboratory. | Experiments | Quiz, Exam |
| S2 | Gain interpersonal and Team work skills by getting opportunities to work productively with others in the laboratory, discussion of results with supervisor and brain storming. | Lecture, experiments | Quiz, Exam |
| Competencies | | | |
| C1 | Demonstrate critical thinking skills, utilize a wide range of information sources and Analyzing information in the laboratory. | Lecture, experiments | Quiz, Exam |
| C2 | Perform analytical lab work, communicate and interpret scientific ideas and principles through oral presentations and written reports. | Lecture, experiments | Quiz, Exam |
| C3 | Demonstrate professional and ethical conduct. | Lecture, experiments | Quiz, Exam |

* includes: Lecture, flipped Class, project- based learning , problem solving based learning, collaborative learning

** includes: quiz, in class and out of class assignment , presentations , reports, videotaped assignment, group or individual projects.

Course Policies

| Policy | Policy Requirements |
|-------------------------|--|
| Passing Grade | The minimum passing grade for the course is (50%) and the minimum final mark recorded on transcript is (35%). |
| Missing Exams | <ul style="list-style-type: none"> Missing an exam without a valid excuse will result in a zero grade to be assigned to the exam or assessment. A Student who misses an exam or scheduled assessment, for a legitimate reason, must submit an official written excuse within a week from the an exam or assessment due date. A student who has an excuse for missing a final exam should submit the excuse to the dean within three days of the missed exam date. |
| Attendance | The student is not allowed to be absent more than (15%) of the total hours prescribed for the course, which equates to six lectures days (M, W) and seven lectures (S,T,R). If the student misses more than (15%) of the total hours prescribed for the course without a satisfactory excuse accepted by the dean of the faculty, s/he will be prohibited from taking the final exam and the grade in that course is considered (zero), but if the absence is due to illness or a compulsive excuse accepted by the dean of the college, then withdrawal grade will be recorded. |
| Academic Honesty | Philadelphia University pays special attention to the issue of academic integrity, and the penalties stipulated in the university's instructions are applied to those who are proven to have committed an act that violates academic integrity, such as: cheating, plagiarism (academic theft), collusion, and violating intellectual property rights. |

Program Learning Outcomes to be Assessed in this Course

| Number | Learning Outcome | Course Title | Assessment Method | Target Performance level |
|------------|--|--|-------------------|--------------------------|
| Kp3 | Understand the molecular techniques including: immunological techniques, gene cloning, polymerase chain reaction, DNA sequencing, gene editing, blotting and nucleic acids hybridizations along with the basic skills of laboratory organization and management. | DNA extraction DNA concentration Agarose gel electrophoresis | Quiz, Exam | 100% |
| Kp4 | Understand the basic principles of heredity in particular the inheritance patterns of human traits and its implication on human health and possible gene therapy. | Meeting Drosophila Drosophila mutant Monohybrid cross Dihybrid cross | Quiz, Exam | 100% |

| | | | | |
|------------|--|---|------------|------|
| | | Mutation Ames test | | |
| Sp1 | Demonstrate ability and responsibility in using, preserving and maintaining laboratory equipment's necessary in the applications of biotechnology and related fields. | All | Quiz, Exam | 100% |
| Sp2 | Investigate and analyze the role of heredity and molecular genetics in a wide range of application. | Meeting Drosophila Drosophila mutant Monohybrid cross Dihybrid cross | Quiz, Exam | 100% |
| Sp5 | Practicing time management, balancing workload, implementing and following biosafety regulations, designing, managing and running biological laboratories and biotech firms. | All | Quiz, Exam | 100% |
| Cp2 | Demonstrate critical thinking skills utilize a wide range of information sources and communicate through oral presentations and written reports. | All | Quiz, Exam | 100% |
| Cp3 | Recognize the need for, and have the preparation and ability to engage in life-long learning independently, with a high level of enthusiasm and commitment to improve knowledge and competence continuously. | All | Quiz, Exam | 100% |
| Cp4 | Demonstrate professional and ethical conduct in compliance with bio risk and biosafety regulations. | All | Quiz, Exam | 100% |

Description of Program Learning Outcome Assessment Method

| Number | Detailed Description of Assessment |
|--------|------------------------------------|
| 1 | Weekly Quiz |
| 2 | Weekly report |
| 3 | Mid term and final exam |
| | |
| | |
| | |

Assessment Rubric of the Program Learning Outcome

| Assessed criteria | Complete 3 | Partial 2 | Not at all 1 |
|---|---------------|--------------|-----------------|
| Dealing with <i>Drosophila melanogaster</i> correctly in lab | | | |
| Differentiation between male and female of <i>Drosophila</i> | | | |
| Differentiation between wild-type and mutant of <i>Drosophila</i> | | | |
| Performing monohybrid cross experiment correctly | | | |
| Solving problems about dihybrid cross | | | |
| Performing DNA extraction using available kits | | | |
| Using electrophoresis to detect DNA fragment | | | |
| Defining a bacterial mutation | | | |
| Isolation of streptomycin-resistant mutant bacteria | | | |
| Understanding the purpose of Ames test and performing it | | | |
| | | | |