Philadelphia University	PHILADELPHIA UNIVERSITY THE WAY TO THE FUTURE	**Approval date:**
Faculty: Science		**Issue:**
Department: Biotechnology and Genetic Engineering		**Credit hours: 1**
Academic year 2023-2024	**Course Syllabus**	**Bachelor**

Course information

Course#	Course title		Prerequisite
0240335	**Cytogenetic**		240234
Course type		**Class time**	**Room #**
☐ University Requirement ☐ Faculty Requirement ☒ Major Requirement ☐ Elective ☒ Compulsory		**13:00-14:00 pm S**	**2902**

Instructor Information

Name	Office No.	Phone No.	Office Hours	E-mail
Prof. Dr. Raida Khalil	**914**	**ext. 2250**	**MW: 10:35-11:15 am**	**R_khalil@philadelphia.edu.jo**

Course Delivery Method

Course Delivery Method			
☒ **Physical**	☐ **Online**	☐ **Blended**	
Learning Model			
Precentage	**Synchronous**	**Asynchronous**	**Physical**
			100%

Course Description

For the third year, this module serves as a major (Mandatory) departmental course. This course covers the study of chromosomes and offers cytological justifications for many genetic illnesses.
Chromosome analyses (also known as cytogenetic and molecular cytogenetics) are a crucial laboratory diagnostic procedure for prenatal diagnosis, in some patients with mental retardation and multiple birth defects, in patients with abnormal sexual development, and in some cases of infertility or multiple miscarriages. Additionally helpful in the investigation and development of treatments for patients with cancer and hematologic disorders is cytogenetic analysis.

Course Learning Outcomes

Number	Outcomes	Corresponding Program outcomes
Knowledge		
K1	Explain the organization and complexity of human genome at the Cytogenetic Level	**K_P1**
K2	Explain the nature of chromosomal abnormalities in clinical syndromes associated with cytogenetic disorders	**K_P4**
K3	Evaluate appropriately the family pedigree and the population and ethnic aspects of inherited disorders	**K_P4**
Skills		
S1	Estimate the risk of recurrence of various inherited disorders in affected families	**S_P2**
S2	Explain the essential elements of genetic counseling and indications for prenatal Diagnosis	**S_{P2}**
S3	Knowledge of basic cytogenetic laboratory techniques necessary to prepare tissue samples or cytogenetic diagnosis.	**S_{P2}**
Competencies		
C1	To review recent case reports and text from the cytogenetics literature, to become familiar with the fields of genetics and cytogenetics, and applications to clinical medicine.	C_P1
C2	Understand the importance of genetics in personalized medicine	C_P2

Learning Resources

Course textbook	**Title**: The Principles of Cytogenetics (**2013&2005)** Author(s): S.**Gersen et al.** Publishers: **Totowa, New Jersey: Humana Press** ISBN: 978-1441916877 **& 1-58829-300-9** **Title: The AGT cytogenetic laboratory manual** Author(s): Marilyn S. Arsham, Margaret J. Barch, Helen J. Lawce Publisher: Wiley-Blackwell, Year: 2017 ISBN: 1119061229; 978-1119061229
Supporting References	**Recent literature(suggested readings and web sites required for assignments through Philadelphia library resources,**
Supporting websites	https://pubmed.ncbi.nlm.nih.gov. Recent Case reports related to chromosomal aberrations collected from different database and publishers
Teaching Environment	☒**Classroom** ☒ **laboratory** ☐**Learning platform** ☐**Other**

Meetings and subjects timetable

Week	Topic	Learning Methods	Tasks	Learning Material
1	**Human Cytogenetic history**	lectures + learning platform + Discussion	Revision Background related to topic Assessment	
2	Gene expression and Cell cycle division **Schedule case report presentation** **10 minutes for each of the 3 students presentation: case report**	lectures + learning platform + Discussion	**Assessment**	
3	The organization and complexity of human genome at the Cytogenetic Level **10 minutes students presentation(2): case report**	**Lecture** problem solving based learning	**Assessment Article assigned**	
4	The Era of Chromosome definition groups **10 minutes students presentation (2): case report**	**Lectures+** , problem solving based learning	**Presentation According to assigned schedule**	
5	Cytogenetic laboratory techniques **10 minutes students presentation(2): case report** Prenatal Diagnosis: CVS, Blood cord, Amniotic fluid , tumor tissues, Non-Invasive test , PGD, **10 minutes students presentation (2): case report** Syndromes associated with cytogenetic disorders. **10 minutes students presentation (2): case report**	**Lectures+** , problem solving based learning	**Assessment Article assigned**	
6				
7				
8	The mechanisms which contribute to cytogenetic alterations **10 minutes students presentation (4): case report**	**Lectures+** , problem solving based learning	**Assessment Article assigned**	
9	Molecular Cytogenetics: CGH, FISH, Cytogenomics **10 minutes students presentation (4): case report**	**Lectures+** , problem solving based learning Collaborative learning	**Assessment Article assigned**	
10	Principle of Genetic Counselling **10 minutes students presentation (4): case report**	**Lectures+** , flipped Class	**Assessment Article assigned**	
11	**10 minutes students presentation (4): case report**	**Lectures+** , problem solving based learning	**Assessment Article assigned**	
12				
13	**10 minutes students presentation (4): case report**	**Lectures+** , problem solving based learning	**Assessment Article assigned**	
14	**10 minutes students presentation (4): case report**	**Lectures+**	**Assessment**	

		, problem solving based learning		
15	**10 minutes students presentation (4): case report**	**Lectures+** , problem solving based learning flipped Class	**Article assigned Video**	
16	**Final Exam**			

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

Course Contributing to Learner Skill Development

Using Technology
Educated videos, Links related to topics ; **Learning Analysis Journals** ; presentations prepared by students
Communication skills
Discussion assigned case reports by collaborative learning
Application of concepts learnt
Students will be familiar with consequences of chromosomal aberrations onto the genes and phenotype by referring to different database

Assessment Methods and Grade Distribution

Assessment Methods	Grade Weight	Assessment Time (Week No.)	Link to Course Outcomes
Mid Term Exam	**% 30**	**Week 8**	**K1 and C1**
Various Assessments *	**% 30**	**Each week**	**All**
Final Exam	**% 40**	**Week 16**	**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	Explain the organization and complexity of human genome at the Cytogenetic Level	Lecture problem solving based learning	**Quiz videotaped assignment**
K2	Explain the nature of chromosomal abnormalities in clinical syndromes associated with cytogenetic disorders	Lecture problem solving based learning collaborative learning	**Assignment Quiz**

K3	Evaluate appropriately the family pedigree and the population and ethnic aspects of inherited disorders	Lecture problem solving based learning collaborative learning	**Assignment Quiz Case report Presentation**
Skills			
S1	Estimate the risk of recurrence of various inherited disorders in affected families	problem solving based learning collaborative learning	**Case report Presentation**
S2	Explain the essential elements of genetic counseling and indications for prenatal Diagnosis	flipped Class	assignment Quiz **Case report Presentation**
S3	Knowledge of basic cytogenetic laboratory techniques necessary to prepare tissue samples or cytogenetic diagnosis.	flipped Class collaborative learning	**Case report Presentation**
Competencies			
C1	To review recent case reports and text from the cytogenetics literature, to become familiar with the fields of genetics and cytogenetics, and applications to clinical medicine.	collaborative learning	**Quiz Case report Presentation**
C2	Understand the importance of genetics in personalized medicine	collaborative learning	**Case report Presentation**

* 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 Polices

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	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
K_{p4}	Understand the basic principles of heredity in particular the inheritance patterns of human traits and its implication on human health and possible gene therapy.	**Cytogenetics**	Comprehensive exam	students %100 will achieve 68% and more based on assessment rubric

Description of Program Learning Outcome Assessment Method

Number	Detailed Description of Assessment
Kp4	Comprehensive questions (10 marks included in the final exam)

Assessment Rubric of the Program Learning Outcome

Case report presentation assessment

criteria	score			
	4	**3**	**2**	**1**
Concept	The answers given indicate a thorough understanding of the concept	The answers given indicate a less comprehensive understanding of the concept	The answers given indicate misconceptions	The answers given indicate the student are not understand the concept
Comprehensive	The answers given indicate the ability to relate one information to another , comprehensively	The answers given indicate the ability to relate one information to another , partly	The answers given indicate less ability to relate one information to another	The answers given indicate not comprehensive
Language structure	The answers given in accurate ,short ,and clear sentences	The answers given in accurate and short sentences ,but clear	The answers given in short sentences , but not accurate nor clear	The answers are not given in accurate , short , and clear sentences