**FORMAN CHRISTIAN COLLEGE (A Chartered University)**
***BIOL 203: General Genetics***
***Course Outline* Spring 2023**

| **Instructor Information** | |
|---|---|
| Name | Dr Asma Maqbool |
| Email | asmamaqbool@fccollege.edu.pk |
| Office Hours | Tuesday 11:00-12:30; Wednesday 9:30-11:00 |
| Course Material/ Announcements | Will be shared via Institutional Learning Management System (Moodle) |
| **Course Information** | |
| Lecture<br><br>Lab: | Section (A): Tuesday and Thursday 10:00-10:50 S-341<br>Section (B) Thursday 02:00-3:50; S-331 |
| Course Introduction | This course deals with the basic concept of Mendelian genetics and patterns of inheritance. It comprises the details of Mendelian genetics, incomplete dominance, co-dominance, over dominance, multiple alleles, blood group system, gene interaction, lethality, types of lethality, environmental factors effecting phenotypes, sex determination mechanisms, sex linked inheritance, dosage compensation, non-disjunction phenomenon, linkage and crossing over, cytoplasmic inheritance, quantitative inheritance, variation in chromosome number, variation in chromosome structure, population genetics, problems related to the theoretical course |
| Course Objectives | ○ To have knowledge of inheritance and rules that can be used to analyze inheritance and population genetics.<br>○ To understand the ABO blood group system and its importance during blood transfusion.<br>○ To know the importance of mutation, crossing over and linkage in evolution<br>○ To have an idea of current developments in genetics and its role in human life and society<br>○ To provide an opportunity to work in groups to develop sense of respect, responsibility, and collaborations |
| Learning Outcomes | By the end of the course students will be able to<br>○ To understand and differentiate, Mendelian genetics, extension of Mendel's rules, sex determination mechanism.<br>○ To develop a rationale that epistasis is a function of the interaction of non-allelic genes.<br>○ To draw and analyze the pedigrees to infer inheritance patterns<br>○ To corelate the segregation of alleles and linkage phenomenon<br>○ To identify the anomalies in chromosomes and application of this concept in disease diagnostics & genetic disorder for the welfare of community |
| Text Books & Reference Material | **Books:**<br>1. Stricberger, M.W. Genetics. Macmillan publishing. N.Y. collier Macmillan Publishers, London. |

2. Gardener, E.J. Principles of Genetics, John Wiley and Sons, New York.
3. Benjamin A. Pierce. Genetics : a conceptual approach 2012
4. Klug, W.S. and M.R. Cummings, Concepts of genetics 2003: Pearson Education, Inc.

**Study URL's**

https://www.nature.com/scitable/topicpage/gregor-mendel-and-the-principles-of-inheritance-593/
https://www.genome.gov/genetics-glossary/Mendelian-Inheritance
https://www.ncbi.nlm.nih.gov/books/NBK132145/
https://www2.palomar.edu/anthro/mendel/mendel_1.htm
https://courses.lumenlearning.com/boundless-biology/chapter/laws-of-inheritance/
https://www.britannica.com/science/blood-group/Blood-groups-and-genetic-linkage
http://www.biology.arizona.edu/human_bio/ABO_Crosses.html
https://www.biologydiscussion.com/cytoplasm/cytoplasmic-inheritance-with-diagram-cell-biology/27271
https://www.khanacademy.org/science/ap-biology/heredity/non-mendelian-genetics/a/linkage-mapping
https://www.middleeastmedicalportal.com/an-overview-of-chromosome-aberrations/
https://bujhansi.ac.in/econtent/pages/shortcodes/botany/Euploidy_Polyploidy_Aneuploidy.pdf

## Course Policies & Important things to know

**Attendance**

80% attendance is required in lectures as well as in lab, if a student fail to fulfill the requirement, he/she will not be allowed to appear in final examination. Attendance will be marked at the start of class. Late comers are not allowed to attend the lecture. Mid-term will be objective and subjective while final term will comprise objective, subjective and essay type questions. No tolerance for cheating / plagiarism (University policy will be followed).

**Quizzes and Assignments.**

There will be two quizzes, 1 midterm exam and 1 final exam, 1 Group Presentation, Group assignment &/project. Rubrics of assignments, presentation and oral exam is given at the end of this document. To appear in quizzes and presentations on specified dates is necessary and no makeup will be arranged. In case of absence zero mark will be given in the missed activity. In the blended mode of education if a student missed an online quiz/exam/any other activity. **Make-up of the missed activity will be arranged if a student provides enough evidence. This make up will be face to face on campus not online**.

**Mobile Phone:**

Students are advised to silence their mobiles during lectures and labs.

**Lab Notebook:**

only handwritten lab notebooks will be acceptable. Lab notebooks are required to be completed and signed in each lab classes**. Please submit your lab notebooks on final lab exam day**

**Assessment Criteria**

| Activity to be Assessed | Weight age (%age) |
|---|---|
| Final Exam | 30 |
| Lab Exam | 20 |
| Mid-Term Examination | 25 |
| Assignments | 10 |
| Attendance | 5 |
| Class quizzes | 10 |
| Total | 100 |

## Distribution of course contents:

| Wks | Date | Contents |
|---|---|---|
| 1 | 14 Feb | History of Genetics and Mendelian principles of heredity |
| 2 | 21 | Extension of Mendelian Genetics Incomplete dominance, Co-dominance |
| 3 | 17 | Multiple alleles, Blood group system, Penetrance and Expressivity |
| 4 | 28 | Multiple alleles, Blood group system, Penetrance and Expressivity **(Quiz 1: 2 March at 2:00pm)** |
| 5 | 07 March | Gene interaction- Epistasis, Lethality |
| 6 | 14 | Cytoplasmic inheritance; Pedigree, Sex determination |
| 7 | 21 | Sex determination **(Assignment submission 24 March)** |
| 8 | 28 | Sex determination **(Midterm; 30 March at 2:00pm)** |
| 9 | 04 April | x-linked traits |
| 10 | 11 | Dosage compensation |
| 11 | 18 | Linkage and crossing over **Spring Break** |
| 12 | 25 | Linkage and crossing over |
| 13 | 2 May | Environmental factors effecting phenotypes (**Quiz 2; 04 May at 2:00pm)** |
| 14 | 9 | Variation in chromosome number |
| 15 | 16 | Variation in chromosome number |
| 16 | 23 | Variation in chromosome structure |
| 17 | 30 | Population genetics **(Lab Exam 1 June at 2:00)** |
| 18 | 06 June | Review and discussion, |
| 19. | 12 | Final Exam **(Date and time to be announced)** |
| **Lab Schedule and Course Contents Details** | | |
| Problems pertaining to text will be practiced during the labs. | | |

**Disclaimer**

Considering the situation of the country, the course instructor reserves the right to modify the above plan as need be during the course of the class; however, it won't be done impetuously. Any changes that would be incorporated will be informed well in advance.

| RUBRIC (Presentation) | | | |
|---|---|---|---|
| **Excellent**<br>**90-100%** | **Good**<br>**75-90%** | **Average**<br>**65-75%** | **Satisfactory**<br>**60-65%** |
| • Covered all the aspects of the topic in depth<br>• Well designed with good flow and appropriate use of pictures and graphs<br>• Confident delivery style with clear voice<br>• Good spoken English<br>• Excellent eye content with the audience | • Covered most of aspects of the topic nicely<br>• Well designed with appropriate use of pictures and graphs, but uniformity in the slides absent<br>• Normal confidence in delivery<br>• Good spoken English<br>• Good eye contact with the audience | • Covered some aspects of the topic<br>• Not so well designed.<br>• Uniformity in the slides absent. Inappropriate use of pictures and graphs<br>• Poor confidence and voice not clear.<br>• Spoken English not so good<br>• Normal eye contact with the audience | • Covered the topic superficially<br>• Poor design without use of any pictures and graphs. Only written slides<br>• No confidence in delivery.<br>• Voice not audible.<br>• No eye contact with the audience<br>• Poor spoken English |

| RUBRIC (Assignment) | | | |
|---|---|---|---|
| **Excellent**<br>**90-100%** | **Good**<br>**75-90%** | **Average**<br>**65-75%** | **Satisfactory**<br>**60-65%** |
| • Covered all the points of the assigned topics in depth<br>• Sufficient number of latest and appropriate references cited<br>• Key concepts clearly specified and explained technically<br>• Formatting is according to the provided guidelines | • Covered all the points of the assigned topics superficially<br>• Latest and appropriate references cited but not sufficient in number<br>• Key concepts specified and explained technically<br>• Formatting is according to the provided guidelines | • Few points of the assigned topics are missing<br>• Latest and appropriate references cited but not sufficient in number<br>• Key concepts specified but not explained technically<br>• Formatting is partially according to the provided guidelines | • Most points of the assigned topics are missing<br>• Insufficient references<br>• Key concepts not clearly specified and explained<br>• Formatting is not according to the provided guidelines |

| RUBRIC (Oral Exam) | | | |
|---|---|---|---|
| **Excellent 90-100%** | **Good 75-90%** | **Average 65-75%** | **Satisfactory 60-65%** |
| • Good understanding of the question<br>• Demonstrates deep knowledge, answer almost all the questions with explanations<br>• Answer confidently and use perfect scientific vocabulary | • Fair understanding of the question<br>• Adequate knowledge of most topics; answer most of the questions but fails to elaborate.<br>• Most of the answers are technically correct but confidence not very good<br>• Use 75-80% correct scientific vocabulary | • Normal understanding of the question<br>• Superficial knowledge of topic; only able to answer basic questions.<br>• Few of the answers are technically correct but confidence is not good<br>• answers not to-the-point | • Poor understanding of the question<br>• Superficial knowledge of topic; only able to answer few basic questions<br>• Poor technically knowledge of the subject and low on confidence<br>• Vague answers |