

**FORMAN CHRISTIAN COLLEGE**  
**(A Chartered University)**  
**KAM-School of Life Sciences**  
**Spring Semester 2023**

**Instructor Information**

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**Course Information**

Cell Biology (BIOL 201) Credits: 3 (2 theory + 1 lab)

**Section** **A**

**Course Timings & Venue:**

**Lecture:** **Tuesday & Thursday (1230-1320 hrs) [LAB# S-329]**

**Lab** **Friday (1100-1300 hrs) [Lab # S-321]**

**Course Overview**

This course will examine ultra structure of cell including cell membrane, cell wall, cytoskeleton, nucleus, mitochondria, chloroplast, ribosomes, vacuole, microbodies and cell surface. Course also will have an overview of apoptosis and necrosis, cellular communication (signal transduction), overview of transcription and translation. Mitosis, meiosis, chromosomal aberrations and cell cycle regulation will also be discussed. A brief introduction to stem cells and their application will be added. Updated knowledge about cell biology from scientific journals will also be discussed.

**BOOKS RECOMMENDED** (available in the library; required chapters will be provided to S-Block photocopier)

**TEXT BOOK**

1. Becker, W.M., Kleinsmith, L.J. and Harden, J. 2018. *The World of the Cell*. 9<sup>th</sup> edition. Benjamin Cummings, San Francisco.
2. Alberts Bruce (5<sup>th</sup> Edition-2019)- *Essential Cell Biology*, W. W. Norton & Company.
3. Lehninger's Principles of Biochemistry 4<sup>th</sup> Edition.

## OTHER MATERIALS REQUIRED

Lab coat, lab notebook, surgical gloves, face masks, color markers / pencils, charts

## WEB RESOURCES

1. Howard Hughes Medical Institute. Available: <http://www.hhmi.org/biointeractive>
2. The Biology Project. Cell Biology – Tutorials and Animations. Available: [http://www.biology.arizona.edu/cell\\_bio/cell\\_bio.html](http://www.biology.arizona.edu/cell_bio/cell_bio.html)
3. Cell Biology Animations. Available: <http://www.wisc-online.com/objects/ViewObject.aspx?ID=ap11403>
4. Cells Alive. Excellent resource on Cells through animations. Available: <http://www.cellsalive.com>
5. Stem Cell Case Studies. Available: [http://www.stemcellresources.org/teach\\_case.html](http://www.stemcellresources.org/teach_case.html)
6. Cell Biology and Genetics Learning Site by Nature.com (Free Registration). Available: <http://www.nature.com/scitable> Classroom Address: <http://www.nature.com/scitable/group-join/cell-biology-14873096/34593>
7. Nature - Cell Biology (Journal for updates in Cell Biology Research). Available: <http://www.nature.com/ncb/index.html>
8. Cell Biology - Lab Protocols (useful links). Available: <http://www.cellbio.com/protocols.html>

## Course Objectives

Objectives of this course are:

1. To educate students about fundamentals of structure and function of various cells and their organelles.
2. To demonstrate comparisons between structures of different cells by various aspects with reference to their functions and to evolutionary perspective.
3. To provide learning of cell biology with reference to its applications in various fields of life.
4. To give practice sessions to the students for analysis of real-life problems in cell biology.
5. To demonstrate various experiments in cell biology and give hands on activities / exercises.
6. To familiarize students about the Modern Examination System of GRE regarding Cell Biology

## Learning Outcomes

After the successful completion of this course students will be able to:

1. Describe the structure and function of cells.
2. Compare the basic components of different kinds of cells.
3. Assess and predict the relationship between various cell organelles, biological molecules, and cellular functions.
4. Explain the concept of unity and diversity in cells to depict / demonstrate evolutionary phenomena.
5. Construct knowledge of cell biology for evaluating facts and plan for advanced research in various field of life for the welfare of humankind.
6. Applications of cell biology in various scientific professions
7. Handle experiments independently and in groups, analyze results and write lab report.

## COURSE POLICIES

- **Attendance:** As per university policy at the time of course registration (80%) is compulsory for sitting in final examination. However, more than **5 absences** in lectures and **2 absences** in Lab will result in **loss of marks assigned to class performance**. Coming late to classes will also result in loss of marks.
- **Missed Exams:** If you fail to appear in the quizzes or exam, you will be awarded zero score. **There will be no retake of any quiz or exam.** If absence is due to illness or unavoidable circumstances, you may be allowed to appear in a make-up exam on presenting the proof of reason for absence.
- **Assignments / projects:** Assignments and/or projects should be submitted on time. **All assignments, if not mentioned otherwise in class or lab, should be submitted through a Turnitin account or my email ID mentioned above in Instructor Information. Any assignment sent on another email ID or another way will not be accepted. Submitting assignment / project late will result in loss of marks.**
- **Lab Rules:** Lab reports should be submitted on time. You are expected to bring your lab note books in each practical. Wearing **Lab Coat** is must in each lab, failing which will result in loss of lab performance marks or marking you absent.
- **Plagiarism / Cheating:** There will be no tolerance for cheating or plagiarism. You will either be dropped from the course, or your exam will be cancelled if found cheating in exam. In case of plagiarism found in assignment then you may be marked zero or according to the material plagiarized. The plagiarism policy given in the Student Handbook will be strictly followed.
- **Mobile Phone:** Use of mobile phone is strictly prohibited (other than studies and Moodle and Online quiz) during the class. If you are found doing so, you may be marked absent. **Use of mobile phone for cheating, screenshots, communication, during quizzes and/or examination may result in loss of marks or cancellation of quiz or exam.**

## COURSE EVALUATIONS

Grading will be based on the following criteria:

Activity to be Assessed	Weight age (%age)
Final Exam	25
Mid-Term Examination	15
Assignment(s) / Project(s)	15+5+5
Class Performances (attendance+class activities)	5
Quizzes (2)	15
Lab Performance (lab work and notebook)	5
Lab Exam	10
<b>Total</b>	<b>100</b>

### Grading Policy (As per FCC policy)

Grade	Marks (%)	Grade	Marks (%)
		C+	77-79%
A	93 - 100 %	C	73-76%,
A-	90 - 92%	C-	70-72%,
B+	87-89%	D+	67- 69%,
B	83- 86%	D	60-66%,
B-	80-82%,	F	59 or below

**COURSE CONTENTS AND WEEKLY BREAKUP (Subject to Change in case Holidays Announced by the FCCU during semester)**

Week	Contents	Laboratory Work
1.	Introduction to the course, applications of cell biology, research in cell biology, Evolution of cell, comparison of plant and animal cells	Introduction / lab safety / general principles of lab work, How to make Lab Report
2.	Biological molecules overview in animal cell elaborating structure and function	Safe Hand washing, Using Micro Pipettes, Put on-put off gloves
3.	Biological molecules (carbohydrates) Structure and function of plant cell wall, its comparison with prokaryotic cell wall	Study of various types of cells
4.	Biological molecules (Lipids and protein), Ultra structure of cell: plasma membrane, Movement across cell membrane and its significance	Biochemical tests for carbohydrates
5.	Movement across cell membrane and its significance Structure and function of chloroplast and mitochondria - comparison	Biochemical tests for proteins and lipids
6.	The cytoplasm: endoplasmic reticulum, Golgi complex,	DNA extraction from prokaryotic cell
7.	Lysosomes, microbodies and vacuoles The Nucleus: structure and function of nucleus, nuclear material	Extraction of DNA from plant material
8.	Overview of transcription and translation	Assembling & Disassembling Agarose gel Electrophoresis apparatus
9.	The Cytoskeleton: cilia, flagella, fimbriae, pili, Significance of cytoskeleton	<b>Mid Term Exam</b>
10.	Cell cycle, cell division and its control,	Agarose gel analysis and detection of DNA sample
11.	Apoptosis – programmed cell death, Comparison to necrosis	DNA quantification by visual method.
12.	Introduction to cellular communications (cell signaling), Types of cellular secretions	Quiz -2
13.	Cellular communication – Properties of receptors	Plasmid isolation
14.	Cell signaling pathways	Independently Performing complete Agarose gel electrophoresis with All samples
15.	<b>Final Exam</b>	<b>Lab exam</b>