

### 2.12.1 BCM 1341: CELLULAR BIOLOGY

Pre-requisites: None

Credit Units: 3

#### 2.12.2 Purpose of the course;

To teach the student the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles and to understand how these cellular components are used to generate and utilize energy in cells.

#### 2.12.3 Expected Learning Outcomes of the Course;

At the end of the course, the student should be able to:

1. Explain the basic chemical composition of living matter.
2. Differentiate between the structural characteristics of prokaryotic and eukaryotic cells.
3. State the taxonomy and characteristics of the major kingdoms.
4. Describe the structure and function of biological membranes including the roles of gradients in energy transduction.
5. State the basic concepts of bioenergetics, photosynthesis, and cellular respiration.
6. Explain the mechanics of cellular reproduction.

#### 2.12.4 Course Content

**Introduction to biological chemistry:** Organization of matter, Atomic theory, bonding between atoms, Water and its properties, Acids, bases, and salts, Carbon compounds, Biochemical Compounds. **Cell structure and function:** Cell theory, Composition and function of cell structures, Cell membranes and membranous organelles, Comparison of prokaryotic and eukaryotic cells, Comparison of plant and animal cells. **Classification:** Comparison of autotrophs and heterotrophs, Comparison of aerobes and anaerobes, Classification schemes, Kingdoms, their characteristics, and examples. **Cellular transport:** Structure of cell membrane, Diffusion and osmosis, Facilitated and active transport, Endocytosis and exocytosis. **Bioenergetics:** Metabolism, Enzymes, Energy and ATP, Hydrogen and electron carriers. **Cellular respiration:** Aerobic respiration, Anaerobic respiration, Fermentation, Mitochondrial structure. **Photosynthesis:** Nature of light, Pigments, Light-dependent reactions, Light-independent reactions, Chloroplast structure. **Cellular reproduction:** Binary fission, Chromosome structure, Cell Cycle, Stages of mitosis, Stages of meiosis. **Protein synthesis:** Structure of DNA and its replication, Structure of RNA, Protein synthesis, Chemical basis of mutation.

#### 2.12.5 Mode of Delivery;

**Lectures, power point presentations, and class discussions. Video demonstrations and/or CD-Roms** on Cellular Biology when available, after the relevant topic has been covered. **Assignment criteria:** Students will be given several individual or group research assignments on topics relevant to the course. These could include lectures, discovery learning, problem-based learning, experimental learning, group-based learning, independent studies and e-learning.

### 2.12.6 Instructional Materials and/or Equipment;

Lecture notes or power points for presentation; Tutorials; Video demonstrations; CD-Roms; biochemical charts.

### 2.12.7 Course Assessment;

#### Distribution of Marks

Attendance & Participation	5%
Continuous Assessment Tests /Quizzes(atleast 2 sit in)	20%
Term Paper/Group Assignment or Individual	15%
Mid-Quarter Exam	25%
Final Exam	35%
Total	<b><u>100%</u></b>

#### Grading

90 – 100	A
87 - 89	A <sup>-</sup>
84 - 86	B <sup>+</sup>
80 - 83	B
77 - 79	B <sup>-</sup>
74 - 76	C <sup>+</sup>
70 - 73	C
67 - 69	C <sup>-</sup>
64 - 66	D <sup>+</sup>
62 - 63	D
60 - 61	D <sup>-</sup>
00 - 59	F

### 2.12.8 Core Reading Materials for the Course

Campbell, N. A., Reece, J. B., and Simon, E. J. (2004). Essential Biology with Physiology. 1<sup>st</sup> Edition. Benjamin Cummings, San Francisco.

[Lodish](#), H., [Berk](#), A., [Kaiser](#), C. A., [Krieger](#), M., [Scott](#), M. P., [Bretscher](#), A., [Ploegh](#), H., [Matsudaira](#), P. (2008). Molecular Cell Biology. 6<sup>th</sup> Edition. W. H. Freeman and Company, New York.

### 2.12.9 Recommended Reference Materials

Cammack, R., Attwood, T., Campbell, P., Parish, H., Smith, A., Vella, F., and Stirling, J. (Eds). (2006). Oxford Dictionary of Biochemistry and Molecular Biology. 3<sup>rd</sup> Edition. Oxford University Press, London  
Chatterjea, M. N., Rana, S. (2012). Textbook of medical Biochemistry. 8<sup>th</sup> Edition. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi

Jeremy, M. B., John L. T. and Lubert, S. (2002). Biochemistry. 5<sup>th</sup> Edition. W. H. Freeman & Co., New York

[Meisenberg](#), G., [Simmons](#), W. H. (2012). Principles of Medical Biochemistry. 3<sup>rd</sup> Edition. Saunders, Elsevier, Philadelphia

Nelson, D. L. & Cox, M. M. (2012). Lehninger Principles of Biochemistry. 6<sup>th</sup> Edition. W. H. Freeman & Co., New York

[Reginald H. Garrett](#), R. H., [Grisham](#), C. M. (2013). Biochemistry. 5<sup>th</sup> Edition. Books /Cole Cengage Learning, Belmont, CA

Robert, K. M., Daryl K. G., Mayes, P. A., Rodwell, V. W. (2009). Harper's Illustrated Biochemistry. 29<sup>th</sup> Edition. Lange Medical Books, New York.