**BITS PILANI, DUBAI CAMPUS**

**ACADEMIC – UNDERGRADUATE STUDIES DIVISION**

**First Semester 2022 – 2023**

**Course Handout (Part – II)**

**Date**: 05.09.2022

*In addition to Part I (General Handout for all courses appended to the Time Table) this portion further specific details regarding the course.*

**Course No. : BIOT F211 (3 0 3)**

**Course Title : Biological Chemistry**

**Course Instructors : Dr. Mainak Dutta**

**Instructor-in-charge :** Dr. Mainak Dutta

**Scope and Objective of the Course:**

Biochemistry has been undergoing transition, stimulated by new experimental findings and new insights. Molecular understanding of genetics has transformed the biological sciences and has given a new direction of teaching and research. Biochemistry is the language of biology. Therefore, this course is introduced at the cellular and molecular level and focuses upon biomacromolecules, metabolism of macromolecules, energy yielding and energy requiring processes, genetic information etc. This would help going for higher level activities, appreciation of biochemical problems, evaluation and problem solving.

**Course Pre/Co- requisite** (if any) **& Catalogue / Bulletin Description:** *Given in the* Bulletin *2022 – 2023*

**Text book [TB]:**

Mary K. Campbell and, Shawn O. Farrell,Biochemistry, Cengage Learning 5th edition 2009

**Reference book(s) [RB]:**

**(R1):** Lehninger Principles of Biochemistry’, Nelson DL & Cox MM, W.H. Freeman & Co. 4th Ed. 2005

**(R2):** Harper’s Illustrated Biochemistry 30th edition. Robert K. Murray, Daryl K. Granner, Peter A. Mayes and Victor W Rodwell.

**(R3):** Biochemistry, J. M. Berg, J. L. Tymoczko and L. Stryer, W. H. Freeman and Company, 5th edition

**Course Plan / Schedule:**

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| --- | --- | --- | --- | --- |
| **Lec.No** | **Learning objectives** | **Topics to be covered** | **Chapter No** | **No. of lectures** |
| 1-2 | Introduction | Biochemistry and organization of cell | T: 1 | 2 |
| 3-10 | Chemistry of Biomolecules | Common organic molecules, carbohydrate and lipids, proteins & nucleic acids | T: 3, 4, 8, 9, 16  R1: 4, 7, 8, 10 R3: 3, 12 | 8 |
| 11-16 | Enzymes | Classification, enzyme kinetics, enzyme inhibitors and regulators, allosteric enzymes  multienzyme systems, isoenzymes | T: 6,T: 7  R1: 6  R3: 8 | 6 |
| 17-18 | Vitamins and Coenzymes | Classification of vitamins, structure and functions of some important vitamins, metals in biochemistry | T: 8 | 2 |
| 19-22 | Biochemical Energetics | The concept of free energy, energy rich compounds, coupling of reactions, oxidation-reduction | T: 15,  R1: 13 | 4 |
| 23-29 | Carbohydrate metabolism | Glycolysis, storage and control of carbohydrate metabolism, utilization of carbohydrates, reversal of glycolytic sequences, regulation of glycolysis, pentose phosphate pathway, TCA cycle, glyoxylic acid cycle | T: 17, T: 18, T: 19 | 7 |
| 30-34 | Biological oxidations | Components involved in ETC, respiratory chain, Oxidative phosphorylation | T: 20,  R3: 18 | 5 |
| 35-37 | Photosynthesis | Introduction, Calvin Cycle, C4 pathway | T: 22 | 3 |
| 38-43 | Lipid metabolism | Hydrolysis and transport of fats, β-oxidation, oxidation of unsaturated fatty acids, formation of ketones bodies, biosynthesis of fatty acids | T: 21,  R1: 21, R1: 17 | 6 |
| 44-48 | Amino Acid and Protein Metabolism | Assimilation of ammonia, catabolism of amino acids, urea cycle | T: 23,  R1: 18 | 5 |
| 49-52 | Nucleic Acid metabolism | Purine biosynthesis, pyrimidine biosynthesis, salvage pathway | T: 23  R3: 25 | 4 |
| 53-56 | Integration of metabolism | Nutrition, cellular signaling, hormones and control of metabolism | T: 24 | 4 |

\* The lectures may be slightly diverge from aforesaid plan based on students ‘background & interest in the topic, which may perhaps include special lectures and discussions that would be planned and schedule notified accordingly.

**Evaluation scheme:**

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| --- | --- | --- | --- | --- | --- | --- |
| **EC No.** | **Evaluation Components** | **Nature of Component** | **Duration** | **Weightage** | **Date & Time** | **Venue** |
| 1 | Mid Sem Exam | Open Book | 50 minutes | 30 % | 07.11.22 **(AN)** | **To be announced** |
| 3 | Quizzes and Assignments | Some will be open-book | To be announced | 30 %  *#(Breakup provided below)* | To be held periodically |
| 4 | Comprehensive Examination | Open/Closed Book | 3 hours | 40 % | 04.01.23 (**FN)** |

\* Only prescribed text book(s), PowerPoint slides and hand-written notes are permitted

**Quizzes and Assignment / Case Studies**:

**#Quizzes:** Three quizzes will be conducted before mid-sem grading out of which best two (5% weightage each) will be considered for grading. Another three quizzes will be conducted after mid-sem grading out of which best two (5% weightage) will be considered for grading.

**#Assignment/Case studies:** Assignment will be given on either some or all of the above mentioned topics. Case studies, interpretation of data and then analysis, may form part of the evaluation component. Assignments(s) may include seminar presentation and viva. Assignment will comprise of 10% weightage.

Details will be intimated through a separate notification or announced in the class and the deadlines would be indicated therein. However, all assignments/reports would be completed by 1st week of December 2022. It is necessary that all students stick to time schedule and do not postpone submission of assignments/reports. This will prevent extra load during last two weeks of class work. No make-ups would be allowed for submission of assignments / practical reports.

**Reading Assignments**: Students are advised to read, collect additional information on the above mentioned topics. In addition, awareness w.r.t. latest developments in the area would be an added advantage.

**Mid-sem Grading**:

Mid-sem grading will be displayed after two evaluation components or earlier when- ever about 40 % of evaluation components are completed.

**Note:** **A student will be likely to get “NC”, if he / she** doesn’t appear / appear for the sake of appearing for the evaluation components / scoring zero in pre-compre total.

**Makeup and Attendance policies**:

**Make-ups** are not given as a routine. It is solely dependent upon the genuineness of the circumstances under which a student fails to appear in a scheduled evaluation component. In such circumstances, prior permission should be obtained from the Instructor-in-Charge (I/C).Students with less than 60% of attendance will not be allowed to avail the make-ups. The decision of the I/C in the above matter will be final.

**Attendance:** Every student is expected to be responsible for regularity of his/her attendance in class rooms and laboratories, to appear in scheduled tests and examinations and fulfill all other tasks assigned to him/her in every course. A student should have a minimum of 60% of attendance in a course to be eligible to appear for the Comprehensive Examination in that course. For the students under the purview of Academic Counseling Board (ACB), the Board shall prescribe the minimum attendance requirement on a case-to-case basis. Attendance in the course will be a deciding factor in judging the seriousness of a student which may be directly / indirectly related to grading.

**General timings for consultation**:

T5 will be the chamber consultation hour, however students can meet the concerned instructor by prior appointment mutually convenient for both.

**General instructions**:

Students should come prepared for classes and carry the text book(s) or material(s) as prescribed by the Course Faculty to the class.

**Notices**:

All notices concerning the course will be displayed on the respective Notice Boards or Google classroom.

**Instructor-in-Charge**

BIOT F211

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