KL UNIVERISTY, GUNTUR
FIRST SEMESTER 2010-11
Course Handout
Academic Division

Dated: 07-07-2010

Course No. : BT C201
Course Title : Biochemistry
Course Structure : 3-0-3
Course coordinator : Dr S V Saradhi
Instructors : C.S. Felice

1. Course Description:
Biochemistry is defined as the Chemistry of Life. All the basic molecules responsible for living and sustaining normal life are biomolecules, like carbohydrates, lipids, proteins, nucleic acids and many more. The basic understanding of Biochemistry is a pre requisite for any student trying to establish a research or academic career in the field of Biotechnology. Most of the research in Biotechnology hovers around proteins and nucleic acids especially DNA. Thus it is essential to know the physical, chemical and biological nature of these molecules. This paper describes the anatomical, physiological and biochemical aspects associated with various biomolecules.

2. Scope and Objective of the Course:
After thorough learning of biomolecules the student :
a. Will understand the role of various biomolecules in the human body and their applications in Biotechnology
b. Will assess the various stereo chemical and biochemical behavior of various biomolecules.
c. Will analyze the metabolic fate of individual biomolecules and their fate in the human body with reference to bioenergetics and integration of Metabolism.
d. Will comprehend the industrial applications of biomolecules and inculcate them into carrying out mini projects and future research

3. Books:
(i) Textbooks:
1) Principles of Biochemistry by A L Lehninger, Nelson & Cox, CBS publications
2) Biochemistry by L Stryer 6th ed.2006 (Free man – toppan pub)

(ii) Reference Books:
a. Text book of Biochemistry by west & Todd (Mac Milan)
b. Biochemistry by U. Satyanarayana, Allied and Books Pvt. Ltd. Kolkata

4. Syllabus:
UNIT – I: CARBOHYDRATES
Carbohydrates: Classification, structure and functions of Monosaccharides (Ribose, Glucose, Fructose), Disaccharides (Maltose, Lactose and Sucrose) Polysaccharides (Starch, Cellulose and Glycogen) Metabolic pathways; Glycolysis, & TCA cycle. Electron transport chain and oxidative phosphorylation

UNIT – II: AMINO ACIDS
Classification and structures of standard amino acids, Physical properties of amino acid, metabolism- General reactions of amino acid metabolism - Transmination, Oxidative Deamination and Oxidative Decarboxylation, metabolic fate of amino acids; Nitrogen Excretion and Urea Cycle.

UNIT – III: PROTEINS
Proteins classification, purification and physicochemical characterization. Physical and Chemical Synthesis of Peptides (solid phase peptide synthesis) Primary, secondary, tertiary and quaternary structure and proteins. Folding and functions of Hemoglobin, Myoglobin, and chymotrypsin, factors affecting the folding of proteins.

UNIT-IV: LIPIDS
Lipids: Classification, structure and physio-chemical properties of triglycerides fatty acids, phospholipids and cholesterol. Digestion and absorption of fats. Synthesis and degradation of fatty acids, triglycerides and cholesterol.

UNIT –V: NUCLEIC ACIDS
Nucleic acids: Structure, properties and functions of purines, pyramidines, nucleotides and nucleic acids. Cellular localization, isolation and estimation of nucleic acids. Types of DNA and RNA. Biosynthesis and degradation of purines and pyramidine nucleotides; oligonucleotide synthesis

5.Course Plan:

Lecture No	Learning Objectives	Topics to be Covered	Text / Reference Book	Chapters/Page No.
1.	General introduction to Biochemistry	Introduction	T_2	Ch.1/52-55
2.	**C**riterion based classification and significance	Classification of carbohydrates	T_1	Ch.7/238-241
3.	Structure and functions of glucose fructose and ribose	Monosaccharides (Ribose)	T_1	Ch.7/238-241
4.	Structure and functions of glucose fructose and ribose	Monosaccharides (Ribose)	T_1	Ch.7/238-241
5.	Structure and properties of Sucrose maltose and Lactose	Disaccharides	T_1	Ch.7/245-246
6.	Structure and Properties of starch, cellulose and glycogen	Polysaccharides	T_1	Ch.7/247-249
7.	Oxidation of glucose in the body	Glycolysis	T_1	Ch.14/522-525
8.	Oxidation of glucose in the body	TCA cycle	T_1	Ch.16/602-606
9.	Mechanism of ATP liberation and electron transfer	Electron transport chain	T_1	Ch.19/691-703
10.	How to produce ATP by other means	Oxidative Phosphorylation	T_1	Ch.19/714-716

11.	Role of amino acids as Building blocks of Proteins	Introduction to amino acids	T_1	Ch.7/75
12.	Structures of amino acids	Structures of amino acids	T_1	Ch.3/76-79
13.	Structures of amino acids	Structures of amino acids	T_1	Ch.3/76-79
14.	Physical properties of amino acids	physical properties of amino acids	T_1	Ch.3/82-87
15.	Synthesis of Non essential amino acids	Transamination	T_1	Ch.18/660-664
16.	Removal of ammonia for formation of urea	Deamination and decarboxylation	T_1	Ch.18/660-664
17.	Degradation mechanism	Metabolic fate of amino acids	T_1	Ch.18/657-660
18.	Mechanism of Detoxication	Urea cycle	T_1	Ch.18/665-668
19.	Plant animal and microbial proteins	Proteins classification	T_1	Ch.3/85-89
20.	Isolation and purification	Proteins	T_1	Ch.3/89-96
21.	Isolation and Characterization	Protein purification	T_1	Ch.3/89-96
22.	liquid and solid phase peptide synthesis	Physical and chemical synthesis of peptides	T_1	Ch.3/104-106
23.	Levels and significance	Proteins Structural organization	T_1	Ch.4/116-147
24.	Levels and significance	Proteins Structural organization	T_1	Ch.4/116-147
25.	Examples to illustrate structure	structural organization	T_1	Ch.4/116-147
26.	Introduction & Classification	Lipds.	T_1	Ch.10/343-363
27.	Physical Properties of Potential and most abundant lipid	Triglycerides	T_1	Ch.10/343-363
28.	Chemical Properties of Potential and most abundant lipid	Triglycerides	T_1	Ch.10/343-363
29.	Structure and properties	fatty acids	T_1	Ch.10/343-363
30.	Structure and properties	Phospholipids	T_1	Ch.10/343-363
31.	Structure and properties	Cholesterol	T_1	Ch.10/343-363
32.	Role of enzymes in degrading triglyceride to fatty acids	Digestion and absorption of fats.	T_1	Ch.17/633-636
33.	Construction of LCFA	Synthesis of fatty acids	T_1	Ch.21/794-799
34.	Degradation of LCFA	fatty acids	T_1	Ch.17/637-643
35.	Synthesis and degradation	Triglycerides	T_1	Ch.21/804-806
36.	Synthesis and degradation o	Cholesterol	T_1	Ch.21/816-820

37.	Structure, properties and functions	Purine Bases	T_2	Ch.25/1031-1042
38.	Structure, properties and functions	Pyrimidines	T_2	Ch.5/196-211
39.	Structures and chemical names	Nucleosides and Nucleotides	T_2	Ch.5/196-211
40.	Cellular Localization, Isolation and estimation	Nucleic acids	T_2	Ch.5/196-211
41.	Structures & Significance	DNA and RNA	T_2	Ch.5/196-211
42.	Synthesis and degradation	Purine Nucleotides	T_2	Ch.25/1031-1042 Ch.25/1052-1054
43.	Synthesis and degradation	Pyrimidine Nucleotides	T_2	Ch.25/1044-1049
45	Synthesis & Significance	Oligonucleotides	T_2	Ch.25/1044-1049

6.Self learning material:

Unit	Topic	Source
I	a. Biological significance and applications of Mono di and Oligosacharides b. Chemical coupling and conformational coupling in Bioenergetics	Text Book of biochemistry by Lehninger
II	a. Structures and importance of Non standard amino acids	Text Book of biochemistry by Lehninger
III	a. Folding Mechanisms in Proteins	Genes-VII, Benjamin Lewin
IV	a. Degradation of fatty acids with odd carbon atoms and unsaturated fatty acids	Text Book of biochemistry by Lehninger
V	Types of DNA and their biological Importance	Text Book of biochemistry by Lehninger

7.Evaluation Scheme:

Component	Duration (minutes)	% Weightage	Marks	Date & Time	Venue
Test-1	50 Min	6	10	09.08.2010 09.30 – 10.20	NSH
Test-2	50 Min	6	10	13.09.2010 09.30 – 10.20	NSH
Assignement submission		3	5	Continuous	NSH
Assignment Test	50 Min	3	5	25.10.2010 09.00 – 10.30	NSH
Quiz	30 Min	3	5	25.10.2010 09.00 – 10.30	NSH
Regular Lab Evaluation	Continuous	20	50		
Comprehensive Lab Exam	3 Hrs	15	40		
Comprehensive Exam	3 Hrs	36	60		
Attendance for Theory & Tutorial		3	5	Continuous	
Attendance for Lab		5	10	Continuous	

8. Chamber consultation hour: Informed in the class in first week.

9. Notices: All notices regarding the course will be put in E-learning website.

Course Coordinator