



Sarvodaya Kelavani Samaj Managed

Shri Manibhai Virani & Smt. Navalben Virani Science College, Rajkot

(Autonomous)

Affiliated to Saurashtra University, Rajkot

Reaccredited at the “A” Level (CGPA 3.28) by NAAC

“STAR” College Scheme & Status by MST-DBT

A College with Potential for Excellence – CPE (Phase - II) by UGC

Accredited at the G-AAA Highest Grade ‘A-1’ Level by KCG, Govt. of Gujarat

UGC-DDU KAUSHAL Kendra

GPCB-Government of Gujarat approved Environmental Audit Centre

SCHEME OF LEARNING AND EVALUATION

Of

B. Sc. Biochemistry

(w.e.f June 2021)

Appendix - H

Enclosure-I

Shri Manibhai Virani and Smt. Navalben Virani Science College, Rajkot
(Autonomous)

Affiliated to Saurashtra University, Rajkot

Department of Biochemistry

B.Sc. BIOCHEMISTRY
SCHEME OF LEARNING AND EVALUATION

For the students admitted from A.Y. 2021-2022 & onwards

| Semester I | | | | | | | | | |
|---------------------|--|-------------------|-----------|----------|----------------------|---------------|--|------------|-----------|
| Course Code | Course | Contact Hrs/ week | | | SEE Duration (Hours) | Maximum Marks | | | Credit(s) |
| | | T | Tu | P | | CI A | SE E | Total | |
| Part-I | | T | Tu | P | | | | | |
| 21UEN101 | Development of Functional English | 3 | - | - | 3 | 40 | 60 | 100 | 3 |
| Part-I Total | | 3 | 0 | 0 | | 40 | 60 | 100 | 3 |
| Part-II | | | | | | | | | |
| 21UBCCC101 | Core-1: Fundamentals of Biochemistry (F) | 4 | - | - | 3 | 30 | 70 | 100 | 4 |
| 21UBCCC102 | Core-2: Molecules of life (F) | 4 | - | - | 3 | 30 | 70 | 100 | 4 |
| 21UBCID101 | IDC-1: Botany | 3 | - | - | 3 | 30 | 70 | 100 | 3 |
| 21UBCCC103 | Core Practical-1: Basic Biochemistry Practical | - | - | 6 | 6 | 40 | 60 | 100 | 3 |
| 21UBCID102 | IDC-1 Practical: Botany | - | - | 6 | 3 | 40 | 60 | 100 | 2 |
| | Core Enrichment 1: Concept to Practice Course | - | 1 | - | - | (20) | Evaluation at the end of Semester - IV | | |

| | | | | | | | | | |
|--|---|----------------|-------------|----------------|------------|--|------------|------------|--------------|
| | Part-II Total | 1 1 | 1 | 1 2 | -- | 190 | 330 | 500 | 16 |
| Part-III: Ability Enhancement Courses | | | | | | | | | |
| 21AESD101 | AECC I: Introduction to SDG (Online course) | - | - | - | - | - | - | Remarks | Audit course |
| | AECC II: Environmental Conservation and Sustainable Development | 1 | - | - | - | Evaluation at the end of Semester II | | | - |
| | AECC III: Human Values for Holistic Living | 1 | 2* | - | - | Evaluation at the end of Semester II | | | - |
| | FS 3: Career Acceleration Program | 2* | - | - | - | Cumulative Evaluation at the end of Semester V | | | - |
| | Part-III Total | 2 | 2* | 0 | | 00 | 0 | 0 | 0 |
| | Total (Part-I to Part-III) | 16 | 1+2* | 12 | | 230 | 390 | 600 | 19 |
| | | 29 | | | 600 | | | | |

* Out of working Hours

() Final Evaluation for 100 marks be made at the end of Semester IV, which includes 20 marks CIA in Semester I, II, III each and 40 marks in Semester IV.

**Shri Manibhai Virani and Smt. Navalben Virani Science College, Rajkot
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Department of Biochemistry

B.Sc. BIOCHEMISTRY

SCHEME OF LEARNING AND EVALUATION

For the students admitted from A.Y. 2021-2022 & onwards

| Semester II | | | | | | | | | |
|--|--|--------------------------|-----------|-----------|-----------------------------|----------------------|--|--------------|------------------|
| Course Code | Course | Contact Hrs/ week | | | SEE Duration (Hours) | Maximum Marks | | | Credit(s) |
| | | T | Tu | P | | CIA | SEE | Total | |
| Part-I | | T | Tu | P | | | | | |
| | Functional English | 3 | - | - | 3 | 40 | 60 | 100 | 3 |
| | Part-I Total | 3 | 0 | 0 | 3 | 40 | 60 | 100 | 3 |
| Part-II | | | | | | | | | |
| 21UBCCC201 | Core-3: Cell Biology | 4 | - | - | 3 | 30 | 70 | 100 | 4 |
| 21UBCCC202 | Core-4: Human Physiology I | 4 | - | - | 3 | 30 | 70 | 100 | 4 |
| 21UBCCC203 | Core-5: Human Physiology II & Endocrinology | 4 | - | - | 3 | 30 | 70 | 100 | 4 |
| 21UBCID201 | IDC-2: Zoology | 3 | - | - | 3 | 30 | 70 | 100 | 3 |
| 21UBCCC204 | Core Practical-2: Cell Biology & Human Physiology Practicals | - | - | 6 | 6 | 40 | 60 | 100 | 3 |
| 21UBCID202 | IDC Practical-2: Zoology | - | - | 6 | 3 | 40 | 60 | 100 | 2 |
| | Core Enrichment 1: Concept to Practice Course | - | 1 | - | - | (20) | Evaluation at the end of Semester – IV | | |
| | Part-II Total | 15 | 1 | 12 | -- | 220 | 400 | 600 | 20 |
| Part-III: Ability Enhancement Courses | | | | | | | | | |
| 21AEES201 | AECC II: Environmental Conservation and Sustainable Development | 1 | - | - | - | Remarks | | | 2 |
| | AECC III: | 1 | 2* | - | - | Remarks | | | 3 |

| Semester II | | | | | | | | | |
|--------------------|--|--------------------------|-------------|-----------|-----------------------------|--|------------|--------------|------------------|
| Course Code | Course | Contact Hrs/ week | | | SEE Duration (Hours) | Maximum Marks | | | Credit(s) |
| | | | | | | CIA | SEE | Total | |
| | Human Values for Holistic Living | | | | | | | | |
| 21AEVE201 | FS 3: Career Acceleration Program | 2* | - | - | - | Cumulative Evaluation at the end of Semester V | | | - |
| | Part-III Total | 2 | 2* | 0 | - | 0 | 0 | 0 | 5 |
| | Total (Part-I to Part-III) | 20 | 1+2* | 12 | - | 260 | 460 | 700 | 28 |
| | | 33 | | | - | 700 | | | |

*Out of working Hours

3 hours each on Day1 and Day 2.

() Final Evaluation for 100 marks be made at the end of Semester IV, which includes 20 marks CIA in Semester I, II, III each and 40 marks in Semester IV.

Minimum one month internship pertaining to learning for concept to practice/prototype or product development for start-up/mini and final semester project/skilling in the summer vacation/combination of semester break and summer vacation in industry/premier research institute/NGO, etc.

Enclosure II

**Shree Manibhai Virani and Smt.Navalben Virani Science College, Rajkot
(Autonomous)
Affiliated to Saurashtra University, Rajkot**

B.Sc. BIOCHEMISTRY

Semester II Syllabus

For Students Admitted From A.Y.2021-2022 and Onwards

Department: **Biochemistry**
Biochemistry

Programme: **B.Sc.**

| Semester – II | | |
|----------------------|-------------------------|----------------|
| Course Code | Course Title (F) | Credits |
| 21UBCCC201 | Cell Biology | 4 Credits |

Course Description:

The course provides a detailed insight into basic concepts of cellular structure and function. The course content will examine different areas of cellular biology including structure and function of prokaryotic and eukaryotic cells, tools and techniques to study cell and components, Structure and composition of cell wall, cell membrane and methods to fractionate cellular components. This course also gives an account to study complex regulatory mechanisms that control cellular reproduction.

Course Purpose:

Cell biology is an interdisciplinary subject integrating the fields of biochemistry, molecular cell biology and genetics. The aim of the course is to give basic knowledge about the structure and function of cells and cellular components. Understanding the fundamentals of cell biology fulfills the requirements to learn advanced courses like molecular biology, immunology, advanced cell biology etc.

Course Outcomes: Upon completion of this course, the learner will be able to

| CO No. | CO Statement | Blooms taxonomy Level (K ₁ to K ₆) |
|-----------------|--|---|
| CO ₁ | Explain and Compare the basic concept of structures, properties, functions, differences of a prokaryotic and eukaryotic cell. | K ₁ , K ₂ , |
| CO ₂ | Illustrate and relate the principle and functioning of different microscopic methods applied to study cell and cell structures. | K ₁ , K ₂ , K ₃ |
| CO ₃ | Demonstrate the different models proposed on the structure of cell membrane and Identify the structure & function of the different organelles of a cell. | K ₁ , K ₂ , K ₃ |
| CO ₄ | Compare structural and functional aspects of cilia- flagella . Identify and Relate the role of cytoskeleton components in the cellular organization | K ₁ , K ₂ , K ₃ |
| CO ₅ | Describe, Classify and Sketch the events in cell cycle and cell division. | K ₁ , K ₂ , K ₃ |

| Course Content | Hours |
|--|---------------|
| Unit 1: Introduction to cell, cell morphology and cell theories | 12 hrs |

| | |
|--|---------------|
| <ul style="list-style-type: none"> ● History of cell biology ● Introduction to Cell (Cell size, Cell Volume and Cell number) and levels of organizations in biology ● Structure and Characteristics of Prokaryotic cell (archaea and eubacteria) ● Structural and functional diversity in Eukaryotic cell ● Comparison of Prokaryotic and Eukaryotic cell | |
| Unit 2: Tools and Techniques | 12hrs |
| <ul style="list-style-type: none"> ● Light microscopy: Principle, optical arrangements, sample preparation and applications ● Phase contrast microscopy and fluorescence microscopy: Basic Principles and Applications ● Overview of Electron Microscopy: SEM and TEM ● Principle and technique for Subcellular fractionation | |
| Unit 3: Cell Organelles | 12 hrs |
| <ul style="list-style-type: none"> ● Concept and significance of cellular compartmentalization in eukaryotic cell ● Structure, composition and function of Plasma membrane and Nucleus ● Membranous Organelles: Endoplasmic reticulum, Golgi complex, lysosomes and Microbodies (Peroxisomes and Glyoxysomes) ● Energy Harnessing Organelles: Mitochondria and Chloroplasts ● Maternal inheritance of mitochondria and endosymbiosis hypothesis regarding origin of mitochondria. | |
| Unit 4: Cell wall and Components of Cytoskeleton | 12 hrs |
| <ul style="list-style-type: none"> ● Structure, composition and functions of Prokaryotic cell wall and Plant cell wall ● Structure, composition and functions of microtubules, microfilaments and intermediate filaments ● Intracellular localization of cytoskeleton components ● Cytoskeleton as a target for anticancer drugs ● Comparison of centrioles, cilia and flagella | |
| Unit 5: Cell cycle, cell death and cell renewal | 12 hrs |
| <ul style="list-style-type: none"> ● Phases of eukaryotic cell cycle and overview of its regulation ● Process of mitotic cell division and its physiological significance ● Events in meiotic cell division and its significance ● Comparison of apoptosis and necrosis ● Parthenogenesis and stem cells - Brief outline. | |

Text books (2 textbooks):

1. Robertis De (2011). *Cell and Molecular Biology* / 8th Edn. Wolter Kluwer (Unit 2 and 5)

2. Verma P.S. and Agarwal V.K. (2004). *Cell Biology, Genetics, Molecular Biology, Evolution & Ecology* , S Chand Publishing, New Delhi.(Unit 1,3 and 4)

Reference books (2 or 3 reference books):

1. Cooper, G.M. and Hausman, R.E., (2009) .*The Cell: A Molecular Approach* (5th ed.), ASM Press & Sunderland (Washington DC), Sinauer Associates, MA,

2. Lodish, H., Berk, A., Zipursky, S.L., Matsudaira, P., Baltimore, D. and Darnell. (2012) *Molecular Cell Biology* 7th ed., J., W.H. Freeman & Company ,New York,

3. Alberts, B., Johnson,A., Lewis, J., and Enlarge, M. (2008) *Molecular Biology of the Cell*, 5th ed., , Garland Science (Princeton).

Pedagogic tools:

- Chalk and Board
- Power point presentation
- Seminar
- Videos

Methods of Assessment & Tools:

Components of CIE:30 marks (Example as below)

| Sr. No. | Component | Content | Duration (if any) | Marks | Sub Total |
|-----------------------|----------------|---|------------------------|-----------------|-----------|
| A | Test 1 | 1 st 2 units | 1 ^{1/2} hours | 5 (Set for 30) | 20 |
| | Test 2 | All 5 units | 3 hours | 15 (Set for 70) | |
| B | Assignment | | | 05 | 10 |
| C | Class activity | | | 05 | |
| Grand Total | | | | | 30 |
| Assignment | | <ul style="list-style-type: none"> ● Abstract and executive summary ● Case study writing ● Concept mapping ● Student generated handbook ● Essay writing etc... | | | |
| Class activity | | <ul style="list-style-type: none"> ● Reaction paper ● Quiz ● One-minute paper ● Situation based question ● Application card etc.. | | | |

Note : Any other assessment tools or methods can be adopted as per requirement of the course.

| | | |
|---|--------------------------------------|-----------------------------|
| Foundation Course | | |
| For the students admitted from A.Y. 2021-2022 & onwards | | |
| Offering Department: Biochemistry | Offered to: B.Sc Biochemistry | |
| Semester – II | | |
| Course Code | Course Title (F) | Course Credit and Hours |
| 21UBCCC202 | Human Physiology-I | 4 Credits - 4 hrs/wk |

Course Description:

The course involves the study of the functioning of human tissues, organs and organ systems, emphasizing the physical, chemical and mechanistic bases of normal physiology and the integrated function of the human body. It covers major systems of the body including the circulatory, respiratory, digestive, cardiovascular and urinary systems. The course also introduces pathophysiological changes associated with human diseases.

Course Purpose:

An overall goal of this course is to enable students to understand the role of organs, and organ systems in human health and disease. Course focuses on understanding physiology –the functioning of a living organism and its component parts. This requires going beyond memorization of facts to acquire an understanding of how and why the body functions the way it does, and what happens when it does not function properly. This course also provides excellent preparation for careers in biomedical research and the health professions or related disciplines.

Course Outcomes: Upon completion of this course,

| CO No. | CO Statement | Blooms taxonomy Level (K ₁ to K ₆) |
|-----------------|---|---|
| CO ₁ | Identify the relationship between anatomy & physiology and the major levels of organization from molecules to organism. | K1, K2 |
| CO ₂ | Recognize and identify the principle tissue, major components, regulation and functions of physiological systems. | K1, K2, K3 |
| CO ₃ | Explain and describe the composition, function of various body fluids like blood and lymph, their significance and related disorders. | K1, K2, K3 |
| CO ₄ | Describe the mechanism of urine formation and excretion of urine renal system. | K1, K2 |
| CO ₅ | Enlist, Interpret and Identify various disorders related to major systems of the body. | K1, K2, K3 |

| Course Content | Hours |
|--|---------------|
| Unit-I : Homeostasis and Blood | 12 hrs |
| <ul style="list-style-type: none"> • Intracellular, extracellular and interstitial fluid. • Homeostasis, control system and their components. • Components of blood, functions and overview of erythropoiesis and leucopoiesis. • Blood grouping and clotting - ABO and rhesus (Rh) system, Blood clotting | |

| | |
|---|---------------|
| <p>factors, Intrinsic and extrinsic pathways for blood coagulation.</p> <ul style="list-style-type: none"> • Hematological disorders – Types of anemia, polycythemia, leukemia, hemophilia, thrombocytopenia, etc. | |
| Unit-II: Cardiovascular physiology | 12 hrs |
| <ul style="list-style-type: none"> • Overview of Anatomy and Physiology of the cardiac muscle. • Brief Anatomy of heart and blood vessels. • Mechanism of Cardiac cycle, heart sounds, ventricular volumes and the ECG. • Disorders: Hypertension, congestive heart disease, atherosclerosis and myocardial infarction. | |
| Unit- III: Respiratory system | 12 hrs |
| <ul style="list-style-type: none"> • Components and functions of pulmonary system. • Principles and mechanism of exchange and transport of respiratory gases. • Role of hemoglobin in transport of oxygen and dissociation curve • Mechanism and Control of respiration, respiratory volumes. • Respiratory disorders: Hypoxia, tuberculosis, emphysema, asthma and pneumonia. | |
| Unit- IV: Renal physiology | 12 hrs |
| <ul style="list-style-type: none"> • Anatomy and functions of the kidney and excretory system, Nephron as functional unit of kidney. • Physiology of glomerular filtration and GFR. • Mechanism of urine formation (Ultra filtration, selective reabsorption and tubular secretion) and excretion. • Renal disorders: Glomerular nephritis, renal failure, dialysis and diuretics. | |
| Unit- V: Gastrointestinal physiology | 12 hrs |
| <ul style="list-style-type: none"> • Brief anatomy of digestive system. • Chemical composition and functions of digestive juices, Overview and control of secretion of digestive juices. • Process of digestion and absorption of carbohydrates, lipids and proteins. • Absorption of water, vitamins and minerals from gastrointestinal tract. • Disorders related to digestive system: Hyperacidity, gastric ulcers, pancreatitis, gall stones, diarrhoea and vomiting | |

Text books:

1. Chaudhuri, S. K. (2011). *Concise medical physiology*. New Central Book Agency; 6th Revised edition .(Unit 1-5)
2. Sembulingam, K., & Sembulingam, P. (2012). *Essentials of medical physiology*. JP Medical

| |
|--|
| Ltd.(Unit 1-5) |
| Reference books: |
| <ol style="list-style-type: none"> Hall, J. E. (2015). Guyton and Hall <i>Textbook of medical physiology</i>. Elsevier Health Sciences. Waugh, A., & Grant, A. (2014). <i>Ross & Wilson anatomy and physiology in health and illness</i>. Elsevier Health Sciences. Churchill Livingstone; 12 edition Tortora, G. J., & Derrickson, B. H. (2014). <i>Principles of anatomy and physiology</i>. John Wiley & Sons. |
| Pedagogic tools: |
| <ul style="list-style-type: none"> Chalk and Board Power point presentation Seminar Videos |

Methods of Assessment& Tools:

Components of CIE: 30 marks (Example as below)

| Sr. No. | Component | Content | Duration (if any) | Marks | Sub Total |
|-----------------------|----------------|--|------------------------|-----------------|-----------|
| A | Test 1 | 1 st 2 units | 1 ^{1/2} hours | 5 (Set for 30) | 20 |
| | Test 2 | All 5 units | 3 hours | 15 (Set for 70) | |
| B | Assignment | | | 05 | 10 |
| C | Class activity | | | 05 | |
| Grand Total | | | | | 30 |
| Assignment | | <ul style="list-style-type: none"> Abstract and executive summary Case study writing Student generated handbook Essay writing etc. | | | |
| Class activity | | <ul style="list-style-type: none"> Quiz Open book test Situation based question Group discussion | | | |

| | |
|---|---------------------------------------|
| Advanced Course | |
| For the students admitted from A.Y. 2021-2022 & onwards | |
| Offering Department: Biochemistry | Offered to: B. Sc Biochemistry |

| Semester – II | | |
|---------------|--|-------------------------|
| Course Code | Course Title (Ad) | Course Credit and Hours |
| 21UBCCC203 | Core-5: Human Physiology –II & Endocrinology | 4 Credits - 4 hrs/wk |

Course Description:

This course introduces students to understand nervous and reproductive systems and their significance to the normal functioning of human body. This course will also address the organization and structure of the endocrine glands , general principles of hormone synthesis, action, degradation, receptors , their relation to other organ systems and hormone-related problems.

Course Purpose:

Humans have over fifty different hormones. This course provides students with a understanding of hormones and their signalling pathways. Knowledge of endocrinology gives a unique opportunity to broaden knowledge and helps to better understand how chemical control and coordination takes place in the human system. Course will help to understand hormone related problems and their complications. The course will also give insights in composition and functions of the reproductive system . Students could pursue this subject during postgraduate, and also continue to gain a doctorate in this field.

Course Outcomes: Upon completion of this course, the learner will be able to

| CO No. | CO Statement | Blooms taxonomy Level (K ₁ to K ₆) |
|-----------------|--|---|
| CO ₁ | Describe and illustrate organization of the nervous system and summarize the organization and structure of the endocrine system. | K1, K2, K4 |
| CO ₂ | Identify, compare and relate functions of the brain, spinal cord, nerves and hormones in effective chemical control and coordination. | K1, K2,K3 |
| CO ₃ | Classify and categorize hormones of different endocrine glands . Explain general principles of hormone synthesis, compare and relate mode of action of various hormones in the human body. | K1, K2, K3,K4 |
| CO ₄ | Explain, summarize and appraise the significant role of organs of reproductive system and Interplay of different hormones in reproductive cycle. | K1, K2.K5 |
| CO ₅ | Define, compare and correlate the knowledge of endocrinology for hormone associated problems . | K1, K2, K4 |

| Course Content | Hours |
|--|---------------|
| Unit I: Neurochemistry and Neurophysiology | 12 hrs |
| <ul style="list-style-type: none"> • Organization of the nervous system. • Structure of a typical neuron. Different types of neuronal and glial cells and their functions. • Generation and conduction of nerve impulse. • Synapses: chemical and electrical synapses. • Neurotransmitter: properties, different types, action and inactivation. | |
| Unit II: Reproductive Physiology | 12 hrs |
| <ul style="list-style-type: none"> • Sex determination and differentiation. • Development of female and male genital tracts. • Spermatogenesis, capacitation and transport of sperm, blood testis barrier. • Ovarian function and its control. • Uterine changes, fertilization and implantation. • Placenta as a feto-maternal unit, gestation and parturition. | |
| Unit III: Introduction to Endocrinology | 12 hrs |
| <ul style="list-style-type: none"> • Chemical signaling - endocrine, paracrine, autocrine, intracrine and neuroendocrine mechanisms. • Chemical classification, properties and functions of hormones. • Different mechanisms of hormone action. • Hormone therapy and its types. | |
| Unit IV: Hypothalamic and Pituitary Hormones, Thyroid gland, Hormones regulating Ca²⁺ homeostasis | 12 hrs |
| <ul style="list-style-type: none"> • Hypothalamic - pituitary and target gland axis. • Feedback regulation cycle. • Physiological and biochemical functions of hypothalamic hormones, pituitary hormones and their disorders – (gigantism, acromegaly, dwarfs and diabetes insipidus) • Biosynthesis, biochemical functions, regulation of thyroid hormone and their disorders (goiter, Grave's disease, cretinism, myxedema) • Basic structure of bone, Calcium regulating hormones (PTH, Vitamin D and calcitonin) and their disorders - rickets, osteomalacia, osteoporosis. | |
| Unit V: Pancreatic and GI tract hormones, Adrenals and Reproductive hormones | 12 hrs |
| <ul style="list-style-type: none"> • Functions and disorders (diabetes type I and type II) of pancreatic hormones • Hormones of heart, kidney and GIT: Adipolectin, gastrin, secretin, CCK, GIP, leptin and ghrelin. • Physiological and biochemical functions and disorders (Addison's disease, Conn's syndrome, Cushing's syndrome) of Adrenal gland | |

| | |
|---|--|
| <ul style="list-style-type: none"> • Male and female sex hormones. • Interplay of hormones during reproductive cycle, pregnancy, parturition and lactation. | |
|---|--|

Text books:

1. Chaudhuri, S. K. (2011). *Concise medical physiology*. New Central Book Agency; 6th Revised edition .(Unit 1-5)
2. Sembulingam, K., & Sembulingam, P. (2012). *Essentials of medical physiology*. JP Medical Ltd.(Unit 1-5)

Reference books:

1. Hall, J. E. (2015). *Guyton and Hall Textbook of medical physiology*. Elsevier Health Sciences.
2. Waugh, A., & Grant, A. (2014). *Ross & Wilson anatomy and physiology in health and illness*. Elsevier Health Sciences. Churchill Livingstone; 12 edition
3. Tortora, G. J., & Derrickson, B. H. (2014). *Principles of anatomy and physiology*. John Wiley & Sons.

Pedagogic tools:

- Chalk and Board
- Power point presentation
- Seminar
- Videos

Methods of Assessment& Tools:

Components of CIE: 30 marks (Example as below)

| Sr. No. | Component | Content | Duration (if any) | Marks | Sub Total |
|--------------------|----------------|---|------------------------|-----------------|-----------|
| A | Test 1 | 1 st 2 units | 1 ^{1/2} hours | 5 (Set for 30) | 20 |
| | Test 2 | All 5 units | 3 hours | 15 (Set for 70) | |
| B | Assignment | | | 05 | 10 |
| C | Class activity | | | 05 | |
| Grand Total | | | | | 30 |
| Assignment | | <ul style="list-style-type: none"> • Abstract and executive summary • Case study writing • Concept mapping • Student generated handbook | | | |

| | |
|-----------------------|---|
| | <ul style="list-style-type: none"> • Essay writing etc. |
| Class activity | <ul style="list-style-type: none"> • Reaction paper • Quiz • One-minute paper • Situation based question • Application card etc. |

Note: Any other assessment tools or methods can be adopted as per requirement of the course.

| Foundation Course | | |
|---|--|-----------------------------|
| For the students admitted from A.Y. 2021-2022 & onwards | | |
| Offering Department: Biochemistry | Offered to: B.Sc Biochemistry | |
| Semester – II | | |
| Course Code | Course Title (F) | Course Credit and Hours |
| 21UBCC204 | Cell biology and Physiology Practical | 3 Credits - 6 hrs/wk |

Course Description:

This laboratory course compliments the theory core courses by providing students with hands on experiences such as examination of permanent slides and micrographs, and performing and analyzing hematological experiments.

Course Purpose:

Understand concepts of cell biology and the relationship between cell biology and functionality for the physiological system. Carry out and understand practical exercises in various aspects of cell biology and human physiology .

Course Outcomes: Upon completion of this course, the learner will be able to

| CO No. | CO Statement | Blooms taxonomy Level (S ₁ to S ₆) |
|-----------------|---|---|
| CO ₁ | Identify and describe the salient features of the different stages of cell division and compare mitosis and meiosis | S ₂ ,S ₃ |
| CO ₂ | Recognize and identify different cell components. | S ₁ , S ₂ S ₃ , S ₄ |
| CO ₃ | Be able to perform, analyze and report on experiments and observations in basic hematological laboratory testing. | S ₂ ,S ₃ , S ₄ S ₅ |
| CO ₄ | Perform urine analysis and evaluate normal and abnormal constituents. | S ₃ , S ₄ S ₅ |
| CO ₅ | Demonstrate understanding of the principles underlying tests of endocrine and reproductive function | S ₂ ,S ₃ |

Suggested laboratory experiments:

1. Staining and Visualization of plant cell
2. Staining and Visualization of animal cell
3. Identification of different stages of mitosis in onion root tip
4. Identification of different stages of meiosis in grasshopper testis
5. Micrographs of different cell components (dry lab)
6. Introduction to Hematology
7. Blood grouping
8. Hemoglobin estimation
9. Understanding of Neubauer chamber
10. Total RBC Count
11. Total WBC Count
12. Differential Count
13. Packed cell volume and Red cell Indices
14. Determination of Red cell Indices
15. Bleeding Time and Clotting Time
16. Urine Analysis
17. hCG based pregnancy test

Pedagogic tools:

- Chalk and Board
- Laboratory Hands on training
- PowerPoint Presentation and Videos.
- Virtual Lab

Text books – Not applicable**Reference Books:**

- Sadasivam, S. and Manickam, A. 2010. *Biochemical Methods*. [Third Edition]. New Age International (P) Ltd., New Delhi.
- Jayaraman, J. 2008. *Laboratory Manual in Biochemistry*. [First Edition Reprint]. New Age International (P) Ltd., New Delhi

Laboratory Manual/ Book

- Manual of Biochemistry Department, Shri M. & N. Virani Science College (Autonomous), Rajkot

Suggested reading / E-resources

- Not Applicable

Suggested MOOCs

- Not Applicable

Methods of assessing the Course Outcomes

The COs of the course will be assessed through

- CIA (Test, Performance, Record book, Viva Voce)
- SEE

CIA Components

Test (After completion of 70-80% of accessible Practicals)

Marks

30

| | |
|-----------------------------|-----------|
| Performance and Record book | 10 |
| Grand Total | 40 |

| Sr. No. | SEE Component | Content | Duration (if any) | Marks | Sub Total |
|--------------------|----------------------|----------------------------|--------------------------|--------------|------------------|
| A | Test | After completion of course | 6 hours | 60 | 60 |
| Grand Total | | | | | 60 |

Enclosure III

**Shree Manibhai Virani and Smt. Navalben Virani Science College, Rajkot
(Autonomous)
Affiliated to Saurashtra University, Rajkot**

B.Sc. BIOCHEMISTRY

**Part III- Ability Enhancement Compulsory Course
Skill Enhancement Course – Value Added**

Syllabus

For Students Admitted From A.Y.2021-2022 and Onwards

| | | |
|---|------------------------------------|-----------------------------|
| Ability Enhancement Compulsory Course For the students admitted from A.Y. 2021-2022 & onwards | | |
| Offering Department: Biochemistry | Offered to: All Departments | |
| Semester – II | | |
| Course Code | Course Title (SEC) | Course Credit and Hours |
| 21AEVA13 | Food Adulteration | 1 Credits - 6 hrs/wk |

Course Description: This course describes different mismatch used for the food adulteration. Reason behind the adulteration and Common adulterants used in food like grains, milk, milk product, fruit and vegetables . Course covers, harmful effect of adulterants & pesticides and detection of adulterants using various physical, chemical and microbial tests.

Course Purpose: To bring a general awareness about the adulterations of food products, motivate and inspire everybody to have a healthy diet. Importance of food safety and quality management. Course aims to develop in stakeholders simple testing methodologies for detection of adulterants with basic set up at home.

Course Outcomes:

| CO No. | CO Statement | Blooms taxonomy Level (K ₁ to K ₆) |
|-----------------|--|---|
| CO ₁ | Understand the side effect of Adulterants on Community Health | K1, K2 |
| CO ₂ | Understand and Perform different test for the detection of adulterants in spices. | K1, K2, K3, K4 |
| CO ₃ | Identify and Analyse the adulterants present in milk and milk product and side effect of microbes in milk. | K2, K3, K4 |
| CO ₄ | Determine and Estimate the types of adulterants present in food grains | K3, K4, K5 |
| CO ₅ | Explain different methods used to remove the pesticides used in fruit and vegetable. | K1, K2 |

| Course Content | Hours |
|---|---------------|
| Unit-I : Types of adulteration and detection methods | 12 hrs |
| a. Introduction: Food and food product definition. b. Prevention of Food Adulteration Act. (PFA) | |

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|--|---------------|
| c. Effect of Adulterants on Community Health | |
| Unit-II: II Detection of adulterants in spices: | 12 hrs |
| a. Introduction and types of Adulterants in spices. b. Detection of adulterants in spices c. Side effect of adulterants in spices. | |
| Unit- III: Types of Adulterants in milk and milk products. | 12 hrs |
| a. Introduction and types of adulterants in milk and milk products. b. Detection of adulterants in milk and milk products. c. Side effect of adulterants in milk and milk products. d. Detection of microorganism in milk (MBRT | |
| Unit- IV: Types of Adulterants in flour, sugar, salt, tea and food grains | 12 hrs |
| a. Introduction and types of adulterants food grains b. Detection of adulterants in food grains. c. Side effect of adulterants food grains | |
| Unit- V: Unit: V Identification of adulterants in fruits and vegetables. | 12 hrs |
| a. Types of adulterants used in fruits and vegetables. b. Side effect of pesticides in fruits and vegetables. c. Methods used for removal of adulterants in fruits and vegetables. | |

Text books:

1. Bruce, E. M. (1917). Detection of the common food adulterants. D. Van Nostrand Company.
2. Hassall, A. H. (1876). Food: its Adulterations, and the Methods for their Detection. Longmans Green.

Reference books:

1. Wiley, Harvey Washington Foods and Their Adulteration Rarebooksclub.com
2. Schlink, Frederick John Eat, Drink, and Be Wary: The Problems of Diet and Food Adulteration Literary Licensing, LLC

Pedagogic tools:

- Chalk and Board
- Power point presentation
- Seminar
- Videos

Methods of Assessment& Tools:

Components of CIA: 100 marks

| Sr. No. | Component | Content | Duration (if any) | Marks | Sub Total |
|------------------------------|-----------------------|--|--------------------------|--------------|------------------|
| A | Test 1 | All Units | 1 hours | 20 | 20 |
| B | Practical Performance | All Units | Continuous assessment | 50 | 50 |
| C | Assignment | | - | 20 | 20 |
| D | Attendance | | - | 10 | 10 |
| Grand Total | | | | | 100 |
| Assignment | | <ul style="list-style-type: none"> • Survey based assignment. • Case study writing • Student generated handbook | | | |
| Practical Performance | | <ul style="list-style-type: none"> • Quiz • Situation based question • Group discussion • Hands on Exercises | | | |