Sanjay Ghodawat University Kolhapur

School of Pharmaceutical Sciences

Department of Pharmacy

B. Sc. Clinical Research & Technology

Curriculum Structure and Syllabus (R25)

Semester: I-II

Programme Structure for B.Sc.: First Year Clinical Research & Technology (R25)

Semester I: Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total credits
UCRPC101	Drug Dosage Forms	3	-	-	3	-	-	3
UCRPC102	Human Anatomy and Physiology I	3	-	-	3	-	-	3
UXXOE01X	Open Elective I	2	-	-	2	-	-	2
UCRPC103	Drug Dosage Forms Lab	-	4	-	-	2	-	2
UCRPC104	Human Anatomy & Physiology I Lab	-	4	-	-	2	-	2
UCRVS101	Clinical Trials Lab	-	2	-	-	1	-	1
UHSAE009	Communicative English	1	2	-	2	-	-	2
UHSVE001	Constitution of India	2	-	-	2	-	-	2
UBTIK102	Indian Medical Knowledge System	2	-	-	2	-	-	2
UISCC0XX	Co-curricular Courses I	-	4	-	-	2	-	2
UHSVE005	Universal Human Values	-	-	-	-	-	-	Audit Course
	Total	**13**	**16**	**-**	**14**	**7**	**-**	**21**

During the Induction Program, students would get an initial exposure to human values through Universal Human Values.

Semester I: Evaluation Scheme

Course Code	Course Name	Theory Marks					Practical Marks		Total
		Internal Assessment				SEE	Term work/ Tutorial	Practical Oral/ POE	
		CA I	CA II	CA III	Total				
UCRPC101	Drug Dosage Forms	10	10	5	25	50	-	-	75
UCRPC102	Human Anatomy and Physiology I	10	10	5	25	50	-	-	75
UXXOE01X	Open Elective I	-	10	5	15	35	-	-	50
UCRPC103	Drug Dosage Forms Lab	-	-	-	-	-	25	25	50
UCRPC104	Human Anatomy & Physiology I Lab	-	-	-	-	-	25	25	50
UCRVS101	Clinical Trials Lab	-	-	-	-	-	25	-	25
UHSAE009	Communicative English	-	10	5	15	35	-	-	50
UHSVE001	Constitution of India	-	10	5	15	35	-	-	50
UBTIK102	Indian Medical Knowledge System	-	10	5	15	35	-	-	50
UISCC0XX	Co-curricular Courses I	-	-	-	-	-	50	-	50
UHSVE005	Universal Human Values	-	-	-	-	-	-	-	Audit Course
								Total	**525**

- Minimum passing is 40% for all courses and evaluation head mentioned above. CA I & CA II- Continuous Assessment, CA III- Faculty evaluation for Theory.

Semester II: Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total credits
UCRPC201	Human Anatomy and Physiology II	3	-	-	3	-	-	3
UCRPC202	Pathophysiology	3	-	-	3	-	-	3
UXXMM0XX	Multidisciplinary Minor I	2	-	-	2	-	-	2
UXXOE02X	Open Elective II	2	-	-	2	-	-	2
UCRPC203	Human Anatomy & Physiology II Lab	-	4		-	2	-	2
UCRPC205	Computer Application & Biostatistics Lab	-	4		-	2	-	2
UHSAE001	Professional Communication	1	2	-	2	-	-	2
USTVE004	Environmental Science & Sustainability	2	-	-	2	-	-	2
UISCC0XX	Co-curricular courses II	-	4	-	-	2	-	2
	Total	**13**	**14**	**-**	**14**	**6**	**-**	**20**

Semester II: Evaluation Scheme

Course Code	Course Name	Theory Marks					Practical Marks		Total
		Internal Assessment				SEE	Term work/ Tutorial	Practical Oral/POE	
		CA I	CA II	CA III	Total				
UCRPC201	Human Anatomy and Physiology II	10	10	5	25	50	-	-	75
UCRPC202	Pathophysiology	10	10	5	25	50	-	-	75
UXXMM0XX	Multidisciplinary Minor I	-	10	5	15	35	-	-	50
UXXOE02X	Open Elective II	-	10	5	15	35	-	-	50
UCRPC203	Human Anatomy & Physiology II Lab	-	-	-	-	-	25	25	50
UCRPC205	Computer Application & Biostatistics Lab	-	-	-	-	-	25	25	50
UHSAE001	Professional Communication	-	10	5	15	35	-	-	50
USTVE004	Environmental Science & Sustainability	-	10	5	15	35	-	-	50
UISCC0XX	Co-curricular courses II	-	-	-	-	-	50	-	50
								Total	**500**

Exit Option:

Students will have the flexibility to enter a programme in odd semesters and exit a programme after the successful completion of even semesters as per their future career needs. Students exiting the First-Year program after securing Major with 40 credits and an additional 4-8 credits core NSQF course/Internship or continue with major & minor.

Course code	Course name	Teaching scheme (Hr/week)			Credits assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UCRPC101	Drug Dosage Forms	3	-	-	3	-	-

Course code	Course name	Evaluation scheme (In semester)					Semester end exam (SEE)		Total (Marks)
		CAI	CAII	CAIII	Total	Min pass	Marks	Min pass	
UCRPC101	Drug Dosage Forms	10	10	5	25	40%	50	40%	75

Course Description

This course introduces fundamental concepts of pharmaceutical dosage forms. It covers the classification, formulation, preparation methods, and evaluation of solid, liquid, semisolid, gaseous, and sterile dosage forms. The course also provides an overview of novel drug delivery systems and immunological products, enabling students to understand the role of dosage forms in safe, effective, and patient-friendly drug administration.

Pre-requisites

Basic knowledge of sciences acquired at the higher secondary (10+2) level. Fundamental understanding of chemistry and biology.

Course Objectives:

1. To explain the principles, classification, and applications of various pharmaceutical dosage forms.
2. To familiarize students with the ingredients, formulation principles, and manufacturing methods of pharmaceutical dosage forms.
3. To impart knowledge of quality control and evaluation parameters used for assessing dosage form performance.
4. To provide an understanding of conventional and novel drug delivery systems employed in modern therapeutics.
5. To acquaint students with sterile pharmaceutical preparations and immunological products used in disease prevention and treatment.

Course outcomes:

After successful completion of this course, students will able to

CO1 **Classify**[2] different pharmaceutical dosage forms and relate their applications in drug delivery.

CO2 **Identify**[1] the formulation components, preparation methods, and evaluation parameters of solid dosage forms.

CO3 **Differentiate**[2] various liquid dosage forms based on their composition, preparation techniques, and evaluation requirements.

CO4 **Examine**[3] the formulation principles and quality evaluation of semisolid and gaseous dosage forms.

CO5 **Illustrate**[3] the preparation requirements and quality attributes of sterile formulations and immunological products.

Module	Unit	Description	Hours
1.0		**Introduction of different dosage forms.**	**9**
	1.1	Definition, classification of different dosage forms with examples-their relative applications. Introduction to solid dosage forms and their evaluation parameters.	
	1.2	Introduction to liquid, semisolid and gaseous dosage forms. Familiarization with new drug delivery systems.	
2.0		**Solid dosage forms**	**9**
	2.1	Tablets: Types, formulations, methods of preparation and evaluation.	
	2.2	Capsules: Classification, composition, evaluation. Other solid forms like powders and granules**,** pills, lozenges, cachets etc.	
3.0		**Liquid dosage forms**	**9**
	3.1	Classification, types, solution, syrup, elixir, emulsion, suspension, dry powder for reconstitution	
	3.2	Formulation, preparation techniques and evaluation.	
4.0		**Semisolid and Gaseous dosage forms**	**9**
	4.1	Topical preparations: Classification, formulation and evaluation of ointments, creams	
	4.2	Pastes, gels, liniments and lotions, suppositories, and pessaries	
5.0		**Sterile formulations**	**9**
	5.1	Injectable, eye drops and eye ointments	
	5.2	Immunological products: Sera, vaccines, toxoids, and the manufacturing methods.	

Textbooks

1. Gupta, A.K. Introduction to Pharmaceutics, 2nd Edition, CBS Publishers & Distributors.
2. Goel, H., Kalra, V., and Tiwary, A.K. *Fundamentals of Pharmaceutics and Dispensing Pharmacy: Theory with Practical Applications*, 1st Edition, Pharma Med Press.
3. Ansel, H.C., et al. *Pharmaceutical Dosage Forms and Drug Delivery Systems*, 9th Edition, Wolters Kluwer (India) Pvt. Ltd., New Delhi.
4. Jain, N.K. and Gupta, G.D. *Modern Dispensing Pharmacy*, 1st Edition, Pharma Book Syndicate.

Reference books

1. Carter, S.J. Cooper and Gunn's Dispensing for Pharmaceutical Students, 12th Edition, CBS Publishers.
2. Khar, R.K., et al. *Lachman/Lieberman's The Theory and Practice of Industrial Pharmacy*, 4th Edition, CBS Publishers.
3. Carter, S.J. *Cooper and Gunn's Tutorial Pharmacy*, 6th Edition, CBS Publishers.

Internal Assessment (CAI, CAII and CAIII):

1. CAI should be based on first two modules and CAII should be based on next two modules, for 10 marks each.
2. CA III shall be assessed for 5 marks separately.

End Semester Examination:

1. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks.
2. The duration of end semester examination shall be two hours.
3. The students need to solve all 5 questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules.

Course code	Course name	Teaching scheme (Hr/week)			Credits assigned		
UCRPC102	Human Anatomy and Physiology I	Theory	Practical	Tutorial	Theory	Practical	Tutorial
		03	-	-	03	-	-

Course code	Course name	Evaluation scheme (In semester)					Semester end exam (SEE)		Total (Marks)
		CAI	CAII	CAIII	Total	Min pass	Marks	Min pass	
UCRPC102	Human Anatomy and Physiology I	10	10	5	25	40%	50	40%	75

Course Description

This course provides foundational knowledge of human anatomy and physiology with emphasis on the structure and functions of cells, tissues, blood, lymphatic system, respiratory system, digestive system, and cardiovascular system. The course enables students to correlate normal body functions with basic pathological conditions and develops the scientific basis required for further studies in health sciences.

Pre-requisite

Basic knowledge of Biology and human body systems.

Course Objectives:

1. To acquire knowledge of cellular organization, tissues, and body membranes.
2. To interpret the composition and physiological functions of blood and lymphatic systems.
3. To relate the anatomy and physiology of the respiratory system with respiratory disorders.
4. To correlate the structure and physiological functions of digestive organs with digestion and metabolism.
5. To apply concepts of cardiovascular anatomy and physiology to circulation and related disorders.

Course outcome(s):

After successful completion of this course, students will able to

CO1 **Identify**[1] the structure and functions of cells, cell organelles, tissues, membranes, and glands.

CO2 **Classify**[2] blood components, blood groups, lymphatic tissues, and immune functions associated with the lymphatic system.

CO3 **Correlate**[3] the anatomy and physiological processes of the respiratory system with pulmonary function and respiratory disorders.

CO4 **Analyze**[4] the anatomy and physiological activities of the gastrointestinal organs involved in digestion, absorption, secretion, and metabolism.

CO5 **Interpret**[3] cardiac structure, cardiac cycle, circulation, blood pressure, and cardiovascular disorders including hypertension and shock.

Module	Unit	Description	Hours
1.0		**Introduction to Cells**	**9**
	1.1	Cells: Structure, function and location, Prokaryotic and eukaryotic cells, Cell organelles, Cell division	
	1.2	Tissue, Types, Structure, Location and Function of Epithelial Tissue, Connective Tissue, Muscle Tissue, Nerve Tissue, Membranes, Glandular tissue.	
2.0		**Introduction to Blood and Lymphatic Systems**	**9**
	2.1	Blood-composition, function, cellular component & their function, hemoglobin & anemia, blood groups and coagulation	
	2.2	Lymphatic system-Composition & function of lymph, lymphatic tissue, Immunity with the role of thymus	
3.0		**Respiratory System**	**9**
	3.1	Respiratory system: Basic anatomy of nose, larynx, trachea, bronchi and lungs Respiratory system: parts of respiratory system, mechanism of respiration, pulmonary function, pulmonary circulation, lungs volume, Gas transport between lungs and tissues	
	3.2	Definition of hypoxia, dyspnoea, cyanosis, asphyxia and obstructive airways diseases	
4.0		**Digestive System**	**9**
	4.1	Digestive system: basic anatomy of oesophagus, stomach, small intestine, large intestine, liver, gall bladder, pancreas	
	4.2	Gastrointestinal physiology: Organs of GIT and their structure & function, secretion, digestion, absorption and assimilation, gastrointestinal hormones, physiology of digestion of carbohydrates, proteins & lipids, Structure & function of liver, spleen, gall bladder & pancreas, Jaundice, Cirrhosis & Pancreatitis	
5.0		**Cardiovascular System**	**9**
	5.1	Cardiovascular system- Basic anatomy of heart.	
	5.2	Cardiovascular system-general arrange, heart, arteries, veins and capillaries, heart structure and function, cardiac cycle, heart sounds, heart rate, blood pressure, mechanism of circulation, definition of hypertension & shock	

Textbooks

1. Anatomy & Physiology in Health and Illness – Ross & Wilson, (2014), 11th Edition, Elsevier Publications.
2. Concise Medical Physiology – Sujit Chaudhuri, (2011), 6th Edition, NCBA.
3. Essentials of Medical Physiology – Sembulingam K, (2012), 6th Edition, Jaypee Publications.

Reference books

1. Principles of Anatomy and Physiology – Gerard J. Tortora and Bryan H. Derrickson, 14th Edition, Wiley Publications.
2. Human Anatomy – Chaurasia B. D., (2016), 7th Edition, CBS Publishers

Internal Assessment (CAI, CAII and CAIII):

1. CAI should be based on first two modules and CAII should be based on next two modules, for 10 marks each.
2. CA III shall be assessed for 5 marks separately.

End Semester Examination:

1. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks.
2. The duration of end semester examination shall be two hours.
3. The students need to solve all 5 questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules.

Course code	Course name	Teaching scheme (Hr/week)			Credits assigned		
UCRPC103	Drug Dosage Forms Lab	Theory	Practical	Tutorial	Theory	Practical	Tutorial
		-	4	-	-	2	-

Course code	Course name	Evaluation scheme (In semester)					Semester end exam (SEE)			Total (Marks)
UCRPC103	Drug Dosage Forms Lab	CAI	CAII	CAIII	Total	Internal Assessment*	ESE*	Term work*/ Tutorial	Pract* Oral/ POE	
		-	-	-	-	-	-	25	25	50

Course Description

This course provides practical knowledge and hands-on training in the preparation and dispensing of various pharmaceutical dosage forms. The course emphasizes formulation techniques, compounding procedures, pharmaceutical calculations, handling of pharmaceutical ingredients, and evaluation of prepared formulations including liquids, suspensions, ointments, creams, powders, injections, tablets, and capsules. The course develops essential laboratory skills required in pharmaceutical formulation and dispensing practices.

Pre-requisite

Basic knowledge of Pharmaceutics and Pharmaceutical Calculations. Basic laboratory handling and safety practices

Course Objectives:

1. To impart knowledge of different pharmaceutical dosage forms and their formulation principles.
2. To develop practical skills in the preparation of liquid dosage forms and suspensions.
3. To train students in compounding semisolid dosage forms such as ointments and creams.
4. To provide hands-on experience in the preparation of powders, granules, tablets, capsules, and sterile formulations.
5. To cultivate professional laboratory practices, documentation, and dispensing skills in pharmaceutics.

Course outcomes:

After successful completion of this course, students will able to

CO1 **Identify**[1] pharmaceutical ingredients, equipment, and formulation requirements for different dosage forms.

CO2 **Prepare**[3] liquid oral formulations and suspensions using appropriate pharmaceutical techniques.

CO3 **Formulate**[3] ointments, creams, and powder dosage forms following standard compounding procedures.

CO4 **Demonstrate**[3] the preparation of sterile injections, granules, tablets, and hard gelatin capsules.

CO5 **Evaluate**[4] the quality, appearance, labeling, and dispensing requirements of pharmaceutical formulations.

List of Experiments

Minimum 10 experiments must be performed

1	Introduction to various dosage forms.
2	Formulation of the following dosage forms **Liquid Oral:** Simple syrup, Piperazine citrate elixir, Aqueous Iodine solution
3	**Suspension**: Calamine lotion, Magnesium hydroxide mixture
4	**Ointment:** Simple ointment base, Sulphur ointment
5	**Cream:** Cetrimide cream
6	**Dry powder:** Effervescent powder granules, Dusting powder
7	**Sterile Injection:** Normal Saline, Calcium gluconate Injection
8	**Tablet: Preparation of** Paracetamol granules
9	**Hard Gelatine Capsule:** Tetracycline capsules

Textbooks

1. A Textbook of Pharmaceutical Formulations – B. M. Mithal, Vallabh Prakashan.
2. Bentley's Textbook of Pharmaceutics – Edited by E. A. Rawlins, Elsevier Publications

Reference books

1. The Theory and Practice of Industrial Pharmacy – Edited by Leon Lachman, Herbert Lieberman and Joseph Kanig, Lea and Febiger, Philadelphia, Varghese Publishing House.

Course code	Course name	Teaching scheme (Hr/week)			Credits assigned		
UCRPC104	Human Anatomy & Physiology I Lab	Theory	Practical	Tutorial	Theory	Practical	Tutorial
		-	4	-	-	2	-

Course code	Course name	Evaluation scheme (In semester)					Semester end exam (SEE)			Total (Marks)
UCRPC104	Human Anatomy & Physiology I Lab	CAI	CAII	CAIII	Total	Internal Assessment*	ESE*	Term work*/ Tutorial	Pract* Oral/ POE	
		-	-	-	-	-	-	25	25	50

Course Description

This practical course provides fundamental laboratory training in human anatomy and physiology. The course focuses on identification of major organs through models and slides, measurement of physiological parameters, and performance of basic hematological investigations. It enables students to develop practical skills in handling laboratory instruments, recording observations, and interpreting normal physiological values relevant to health sciences and pharmacy practice.

Pre-requisite

Basic knowledge of Human Anatomy and Physiology. Awareness of laboratory handling and safety practices

Course Objectives:

1. To impart practical knowledge of human organs and physiological systems through models and slides.
2. To develop skills in measuring vital physiological parameters such as pulse rate and blood pressure.
3. To train students in performing basic hematological tests and blood investigations.
4. To familiarize students with laboratory instruments, procedures, and recording of observations.
5. To cultivate analytical and professional skills required for physiology laboratory practices.

Course outcomes:

After successful completion of this course, students will able to

CO1 **Identify**[1] major organs and tissues using anatomical models and permanent slides.

CO2 **Measure**[3] physiological parameters including pulse rate and blood pressure using standard procedures.

CO3 **Perform**[3] hemoglobin estimation by Sahli's method and CMG method.

CO4 **Determine**[3] total RBC count, WBC count, bleeding time, and clotting time using laboratory techniques.

CO5 **Interpret**[4] normal physiological values and laboratory observations obtained during practical experiments.

List of Experiments

Minimum 10 experiments must be performed

1	Study of compound microscopes.
2	Demonstration of Major organs/tissues through models and permanent slides.
3	To measure pulse rate, heart rate
4	To measure blood pressure
5	To perform Hemoglobin by Sahli's Method
6	To determine blood group.
7	To perform Total RBC count.
8	To perform Total WBC count, differential count.
9	To demonstrate total blood count by cell analyser.
10	To perform bleeding time.
11	To perform clotting time.

Textbooks

1. Practical Physiology – Universities Press.
2. Anatomy and Physiology in Health and Illness – Elsevier Publications.

Reference books

1. Essentials of Medical Physiology – Jaypee Publications.
2. Human Anatomy – CBS Publishers.

Course code	Course name	Teaching scheme (Hr/week)			Credits assigned		
UCRVS101	Clinical Trials Lab	Theory	Practical	Tutorial	Theory	Practical	Tutorial
		-	2	-	-	1	-

Course code	Course name	Evaluation scheme (In semester)					Semester end exam (SEE)			Total (Marks)
UCRVS101	Clinical Trials Lab	CAI	CAII	CAIII	Total	Internal Assessment*	ESE*	Term work*/ Tutorial	Pract* Oral/ POE	
		-	-	-	-	-	-	25	-	25

Course Description

This course provides foundational and practical knowledge of clinical trials with emphasis on trial design, phases of clinical research, and essential regulatory and documentation requirements. It covers key trial initiation documents, site selection processes, confidentiality agreements, feasibility assessments, and investigator undertakings in alignment with international guidelines such as ICH E6 (R3) and 21 CFR Part 11.

Pre-requisite

Basic knowledge of Pharmacology and Pharmaceutics.

Fundamental understanding of Clinical Research concepts.

Awareness of regulatory and ethical guidelines in healthcare research

Course Objectives:

1. To introduce fundamental concepts and scope of clinical trials in drug development.
2. To develop understanding of phases and progression of clinical trials.
3. To familiarize students with trial initiation documents and regulatory requirements.
4. To train students in preparation of essential clinical trial documents such as confidentiality agreements and feasibility questionnaires.
5. To impart knowledge of site selection, qualification, and investigator responsibilities in clinical research.

Course outcomes:

After successful completion of this course, students will able to

CO1 **Identify**[1] fundamental concepts, terminology, and regulatory framework of clinical trials including ICH E6 (R3) and 21 CFR Part 11.

CO2 **Classify**[2] phases of clinical trials based on objectives, study design, and regulatory requirements.

CO3 **Prepare**[3] essential clinical trial initiation documents including confidentiality agreements and feasibility questionnaires.

CO4 **Construct**[3] investigator undertaking forms, protocol signature pages, and site qualification checklists as per regulatory standards.

CO5 **Evaluate**[4] site selection processes and site selection confirmation based on clinical trial feasibility and compliance requirements.

List of Experiments

Minimum 10 experiments must be performed

1	Introduction to Clinical Trials
2	Detailed Discussion about Phases of Clinical Trials.
3	Detailed Discussion Regarding Trial Initiation Documents
4	Making Confidentiality Disclosure Agreement
5	Making Feasibility Disclosure Questionnaire
6	Making Investigator Undertaking
7	Making Protocol Signature Page
8	Site Qualification Checklist
9	Site Selection Confirmation
10	Case studies

Textbooks

1. Principles and Practice of Clinical Research – Academic Press.
2. Clinical Trials: A Practical Guide – Wiley-Blackwell.

Reference books/Guidelines

1. ICH E6 (R3) Guideline for Good Clinical Practice – Regulatory Guideline.
2. 21 CFR Part 11 Electronic Records; Electronic Signatures – Regulatory Code.

Course code	Course name	Teaching scheme (Hr/week)			Credits assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UHSAE009	Communicative English	1	2	-	2	-	-

Course code	Course name	Evaluation scheme (In semester)					Semester end exam (SEE)		Total (Marks)
		CAI	CAII	CAIII	Total	Min pass	Marks	Min pass	
UHSAE009	Communicative English	-	10	5	15	40%	35	40%	50

Course Description

This course is designed to equip students with the necessary skills to communicate clearly and confidently in their professional and personal lives. The course addresses students' difficulties with writing and helps them produce clear, correct, and coherent pieces of writing. By mastering grammar rules, students gain confidence in their ability to express themselves precisely in English. Students will also be trained to critically read emails, blog posts, advertisements, and draft effective paragraphs and essays.

Course Objectives:

1. To train learners in constructing and transforming variety of grammatically correct and meaningful sentences.
2. To enable them to write effective paragraphs and essays.
3. To equip them with necessary skills to transform information from tables.
4. To enable them to read, comprehend, and critically analyse given texts.

Course outcomes:

After successful completion of this course, students will able to

CO1 **Create** and transform variety of grammatically correct and meaningful sentences.

CO2 **Identify** and correct errors.

CO3 **Analyse** the given data and transfer the information.

CO4 **Analyse** and interpret diverse written texts critically.

CO5 **Compose** coherent paragraphs and short essays using appropriate structure and language.

Module	Unit	Description	Hours
1.0		**Language Foundation for Effective Communication**	**3**
	1.1	Parts of Speech in Context	
	1.2	Sentence Structures and Meaning	
	1.3	Tenses in Everyday Communication	
2.0		**Language Accuracy and Professional Expression**	**3**
	2.1	Active and Passive Voice	
	2.2	Direct and Indirect Speech	
	2.3	Subject Verb Agreement Error Correction	
3.0		**Vocabulary, Comprehension and Verbal Ability**	**3**
	3.1	Prefixes, Suffixes, and Root Words	
	3.2	Synonyms and Antonyms, Homonyms, Homophones, and Homographs Idioms and Phrasal Verbs Error detection and correction	
	3.3	Sentence improvement Reading Comprehension Para- jumbles and cloze Tests	
4.0		**Data Interpretation and Information Transfer**	**3**
	4.1	Converting tables, charts, and graphs into coherent paragraphs.	
	4.2	Converting written information into tables, charts, or flow diagrams.	
	4.3	Summarizing numerical and visual data. Describing trends, comparisons, and patterns	
5.0		**Reading Comprehension and Writing**	**3**
	5.1	Scientific Articles Newspaper articles Workplace emails Advertisements Blog posts	
	5.2	Case studies: TED Talk transcripts	
	5.3	Paragraphs and Essays Writing	

References

1. Bakshi, S. P. Objective General English. Arihant Publications, 2022.Leech, Geoffrey, Deucher, Margaret, Hoogenraad, Robert. English Grammar for Today, A New Introduction, 2022
2. Leech, Geoffrey and Svartvik, Jan. A Communicative Grammar of English, Third Edition, 2003.
3. Grellet, Françoise. Developing Reading Skills: A Practical Guide to Reading Comprehension Exercises. Cambridge UP, 2010.
4. Raymond Murphy, Essential English Grammar: A Self-Study Reference and Practice Book for Elementary Students of English with Answers, Cambridge University Press, 2007
5. Green, David. Contemporary English Grammar –Structures and Composition. MacMillan India. 2014 (Print)
6. Fitikides, T. J. Common Mistakes in English. London: Orient Longman, 1984.
7. Lewis, Norman. Word Power Made Easy. Revised and expanded ed., Penguin Books, 2014.
8. Murphy, Raymond. English Grammar in Use. 5th ed., Cambridge UP, 2019.
9. Swan, Michael. Practical English Usage. 4th ed., Oxford UP, 2016.

Websites

https://www.englishclub.com/grammar/quizzes.htm

Internal Assessment (CA I, CA II, CA III):

1. CA II will be based on all the modules.
2. CA III will be assessed for 10 marks separately.

Practical and/or Tutorial:

1. Practical and/or Tutorial will be based on the content in the course.
2. This will be continuously evaluated throughout the semester.
3.There will be an Internal Practical Oral Examination of 10 Marks at the end of the semester.

Course code	Course name	Teaching scheme (Hr/week)			Credits assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UBTIK102	Indian Medical Knowledge System	2	-	-	2	-	-

Course code	Course name	Evaluation scheme (In semester)					Semester end exam (SEE)		Total (Marks)
		CAI	CAII	CAIII	Total	Min pass	Marks	Min pass	
UBTIK102	Indian Medical Knowledge System	-	10	5	15	40%	35	40%	50

Course Description

This course introduces the Indian Knowledge System with a focus on Yoga and Ayurveda for holistic health. It covers basic yoga philosophy, Ayurvedic principles, lifestyle practices, and nutrition, emphasizing preventive healthcare and balanced living through traditional and modern approaches.

Pre-requisites:

Basic understanding of health and biology

Course Objectives:

1. To understand the fundamental principles of Yoga and Ayurveda for maintaining physical and mental well-being.
2. To apply traditional health practices, lifestyle regimens, and nutritional principles for achieving holistic health and sustainability.

Course outcomes:

After successful completion of this course, students will able to

CO1 **Explain**[2] the basic concepts of yoga, Ayurvedic principles of mind and health, daily health regimens, holistic lifestyle practices, and nutritional and detoxification concepts.

CO2 **Interpret**[2] yoga systems, mind-body harmony in Ayurveda, dinacharya practices, holistic health routines, and principles of nutrition and detoxification.

CO3 **Apply**[3] yoga practices, Ayurvedic mental health concepts, daily regimens, lifestyle practices, and nutritional principles for maintaining physical and mental well-being.

CO4 **Analyze**[4] yoga philosophies, Ayurvedic mind-body systems, health regimens, holistic practices, and dietary concepts for improving overall health and wellness.

CO5 **Evaluate**[5] the role of yoga, Ayurveda, lifestyle practices, holistic health systems, and nutrition in promoting physical, mental, and social well-being.

Module	Unit	Description	Hours
1.0		**Yoga and Indian Knowledge System**	**6**
	1.1	Definition, Meaning and objectives of Yoga, Relevance of yoga in modern age.	
	1.2	Brief Introduction of Hatha yoga, Raja yoga, Karma yoga, Gyana Yoga, Bhakti yoga Understanding eight steps of Ashtanga yoga, Understanding Shatkriyas , the six cleansing procedures of Yoga.	
2.0		**Ayurvedic Concepts of Mind and Health**	**6**
	2.1	Concept of Manas in Ayurveda and understanding Mind Body harmony, Triguna based Psychology in Ayurveda and Yoga.	
	2.2	Influence of Tri dosha on Mind, Mind body intellect and consciousness complex.	
3.0		**Health Regimen and Dinacharya**	**6**
	3.1	Understanding Swastha vritta, the healthy regimen to maintain state of wellbeing Dinacharya.	
	3.2	The Daily regimen including Daily detoxification, exercise.	
4.0		**Holistic Health and Daily Practices**	**6**
	4.1	Intake of Food, Water, Air and Sunlight, work and ergonomics, Rest and sleep hygiene.	
	4.2	Ritu charya, the seasonal regimen, Sadvritta and the concept of social wellbeing.	
5.0		**Nutrition and Detoxification**	**6**
	5.1	Understanding trividha upastambhas, three pillars to health.	
	5.2	Concept of Shadrasa in choosing appropriate. Nourishment to the body and mind. Nutraceuticals, Traditional probiotic foods and their importance in human health	

References

1. Mahadevan, B., Bhat, Vinayak Rajat, Nagendra Pavana R.N.Introduction To Indian Knowledge System: Concepts And Applications. (2022). (n.p.): PHI Learning Pvt. Ltd..
2. Chopra, D. (2007). Perfect Health--Revised and Updated: The Complete Mind Body Guide. United States: Harmony/Rodale/Convergent.
3. Lad, V. (1984). Ayurveda: A Practical Guide: The Science of Self Healing. Bahrain: Lotus Press.

Internal Assessment (CAI, CAII and CAIII):

1. CAII should be based on First to Fourth modules, for 10 marks each.
2. CA III shall be assessed for 5 marks separately.

End Semester Examination:

1. Question paper will be of 35 marks comprise of 5 questions, each carrying 07 marks.
2. The duration of end semester examination shall be two hours.
3. The students need to solve all 5 questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules.

Semester II: Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total credits
UCRPC201	Human Anatomy and Physiology II	3	-	-	3	-	-	3
UCRPC202	Pathophysiology	3	-	-	3	-	-	3
UXXMM0XX	Multidisciplinary Minor I	2	-	-	2	-	-	2
UXXOE02X	Open Elective II	2	-	-	2	-	-	2
UCRPC203	Human Anatomy & Physiology II Lab	-	4		-	2	-	2
UCRPC205	Computer Application & Biostatistics Lab	-	4		-	2	-	2
UHSAE001	Professional Communication	1	2	-	2	-	-	2
USTVE004	Environmental Science & Sustainability	2	-	-	2	-	-	2
UISCC0XX	Co-curricular courses II	-	4	-	-	2	-	2
	Total	**13**	**14**	**-**	**14**	**6**	**-**	**20**

Semester II: Evaluation Scheme

Course Code	Course Name	Theory Marks					Practical Marks		Total
		Internal Assessment				SEE	Term work/ Tutorial	Practical Oral/POE	
		CA I	CA II	CA III	Total				
UCRPC201	Human Anatomy and Physiology II	10	10	5	25	50	-	-	75
UCRPC202	Pathophysiology	10	10	5	25	50	-	-	75
UXXMM0XX	Multidisciplinary Minor I	-	10	5	15	35	-	-	50
UXXOE02X	Open Elective II	-	10	5	15	35	-	-	50
UCRPC203	Human Anatomy & Physiology II Lab	-	-	-	-	-	25	25	50
UCRPC205	Computer Application & Biostatistics Lab	-	-	-	-	-	25	25	50
UHSAE001	Professional Communication	-	10	5	15	35	-	-	50
USTVE004	Environmental Science & Sustainability	-	10	5	15	35	-	-	50
UISCC0XX	Co-curricular courses II	-	-	-	-	-	50	-	50
								Total	**500**

Exit Option:

Students will have the flexibility to enter a programme in odd semesters and exit a programme after the successful completion of even semesters as per their future career needs. Students exiting the First-Year program after securing Major with 40 credits and an additional 8 credits core NSQF course/Internship or continue with major & minor.

Course code	Course name	Teaching scheme (Hr/week)			Credits assigned		
UCRPC201	Human Anatomy and Physiology II	Theory	Practical	Tutorial	Theory	Practical	Tutorial
		03	-	-	03	-	-

Evaluation scheme

Course code	Course name	Evaluation scheme (In semester)					Semester end exam (SEE)		Total (Marks)
		CAI	CAII	CAIII	Total	Min pass	Marks	Min pass	
UCRPC201	Human Anatomy and Physiology II	10	10	5	25	40%	50	40%	75

Course Description

This course provides essential knowledge of human anatomy and physiology with focus on reproductive, nervous, endocrine, sensory, and excretory systems. It integrates structural organization with physiological mechanisms such as hormone regulation, neural conduction, sensory perception, and renal function. The course enables learners to relate normal body functions with common physiological disorders, forming a strong foundation for pharmaceutical and biomedical sciences.

Pre-requisite

Basic knowledge of Biology and human body systems.

Fundamental understanding of cell biology and body systems

Course Objectives:

1. To impart knowledge of structure and functions of reproductive, nervous, endocrine, sensory, and excretory systems.
2. To develop understanding of physiological processes such as reproduction, nerve impulse transmission, and hormone regulation.
3. To familiarize students with anatomical organization of major human body systems.
4. To build understanding of sensory mechanisms and renal physiology including urine formation and electrolyte balance.
5. To correlate normal physiological functions with common disorders of human body systems.

Course outcome(s):

After successful completion of this course, students will able to

CO1 **Identify**[1] anatomical structures of reproductive, nervous, endocrine, sensory, and excretory systems.

CO2 **Classify**[2] hormones, cranial nerves, endocrine glands, and sensory organs based on structure and function.

CO3 **Apply**[3] concepts of physiological processes such as menstruation, nerve impulse transmission, and hormone secretion.

CO4 **Analyze**[4] mechanisms of urine formation, electrolyte balance, and acid–base regulation in the human body.

CO5 **Interpret**[4] physiological changes associated with disorders such as diabetes mellitus, thyroid dysfunction, and reproductive abnormalities.

Module	Unit	Description	Hours
1.0		**Reproductive System**	**9**
	1.1	Male & female reproductive organs	
	1.2	Sex hormones, secondary sexual characteristics, puberty, spermatogenesis, oogenesis, menstrual cycle, pregnancy, menopause	
2.0		**Nervous System**	**9**
	2.1	Basic anatomy of brain and spinal cord, meninges and cerebrospinal fluid, Cranial Nerves	
	2.2	General organization of CNS, function of important structure and spinal cord, neuron, nerve impulse, type of nerves according to function	
3.0		**Endocrine System**	**9**
	3.1	Brief anatomy of Pituitary, Thyroid, Pancreas, Adrenal gland	
	3.2	Brief introduction about endocrine glands and their secretion, common endocrinological disorder such as diabetes mellitus, hyper & hypothyroidism, dwarfism, gigantism, tetany	
4.0		**Special Senses**	**9**
	4.1	Basic anatomy of eye,	
	4.2	Basic anatomy of ear and nose	
5.0		**Excretory system**	**9**
	5.1	Basic anatomy of kidney and associated organs	
	5.2	Mechanism of Excretion, Urine formation, Electrolytes: their balances and imbalances Introduction of acidosis and alkalosis	

Textbooks

1. Anatomy & Physiology in Health and Illness – Ross & Wilson, (2014), 11th Edition, Elsevier Publications.
2. Concise Medical Physiology – Sujit Chaudhuri, (2011), 6th Edition, NCBA.
3. Essentials of Medical Physiology – Sembulingam K, (2012), 6th Edition, Jaypee Publications.

Reference books

1. Principles of Anatomy and Physiology – Gerard J. Tortora and Bryan H. Derrickson, 14th Edition, Wiley Publications.
2. Human Anatomy – Chaurasia B. D., (2016), 7th Edition, CBS Publishers

Internal Assessment (CAI, CAII and CAIII):

1. CAI should be based on first two modules and CAII should be based on next two modules, for 10 marks each.
2. CA III shall be assessed for 5 marks separately.

End Semester Examination:

1. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks.
2. The duration of end semester examination shall be two hours.
3. The students need to solve all 5 questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules.

Course code	Course name	Teaching scheme (Hr/week)			Credits assigned		
UCRPC202	Pathophysiology	Theory	Practical	Tutorial	Theory	Practical	Tutorial
		03	-	-	03	-	-

Evaluation scheme

Course code	Course name	Evaluation scheme (In semester)					Semester end exam (SEE)		Total (Marks)
		CAI	CAII	CAIII	Total	Min pass	Marks	Min pass	
UCRPC202	Pathophysiology	10	10	5	25	40%	50	40%	75

Course Description

This course provides comprehensive knowledge of general pathology and disease mechanisms with emphasis on cellular injury, inflammation, repair, and systemic pathological conditions affecting major body systems. It covers cardiovascular, respiratory, renal, hematological, endocrine, nervous, gastrointestinal, infectious, and neoplastic diseases. The course enables students to understand disease progression, etiology, and pathological changes relevant to clinical and pharmaceutical sciences.

Pre-requisite

Basic knowledge of Human Anatomy and Physiology.

Fundamental understanding of cell biology and body systems

Course Objectives:

1. To impart knowledge of basic mechanisms of cell injury, adaptation, and homeostasis.
2. To develop understanding of inflammation, repair processes, and vascular disorders.
3. To familiarize students with pathophysiology of major organ systems including cardiovascular, respiratory, and renal systems.
4. To provide knowledge of hematological, endocrine, nervous, gastrointestinal, and bone disorders.
5. To develop understanding of infectious diseases, sexually transmitted diseases, and principles of cancer biology.

Course outcome(s):

After successful completion of this course, students will able to

CO1 **Identify**[1] basic concepts of cell injury, adaptation, inflammation, and repair mechanisms.

CO2 **Classify**[2] pathological changes associated with cardiovascular, respiratory, and renal disorders.

CO3 **Apply**[3] knowledge of hematological, endocrine, and nervous system disorders to disease conditions.

CO4 **Analyze**[4] mechanisms and progression of gastrointestinal, bone, joint, and metabolic diseases.

CO5 **Interpret**[4] etiological factors and pathological features of infectious diseases and cancer.

Module	Unit	Description	Hours
1.0		**Basic principles of Cell injury and Adaptation:**	**10**
	1.1	Introduction, definitions, Homeostasis, Components and Types of Feedback systems, Causes of cellular injury**,** Pathogenesis (Cell membrane damage, Mitochondrial damage, Ribosome damage, nuclear damage). Morphology of cell injury–Adaptive changes (Atrophy, Hypertrophy, hyperplasia, Metaplasia, Dysplasia)**,** Cell swelling, Intracellular accumulation, Calcification, Enzyme leakage and Cell Death Acidosis & Alkalosis, Electrolyte imbalance	
	1.2	Basic mechanism involved in the process of inflammation and repair: Introduction, Clinical signs of inflammation, Different types of Inflammation, Mechanism of Inflammation – Alteration in vascular permeability and blood flow, migration of WBC's, Mediators of inflammation, Basic principles of wound healing in the skin, Pathophysiology of Atherosclerosis.	
2.0		**Cardiovascular system and Respiratory system**	**10**
	2.1	**Cardiovascular System** Hypertension, congestive heart failure, ischemic heart disease (angina, myocardial infarction, atherosclerosis and arteriosclerosis).	
	2.2	**Respiratory system:** Asthma, Chronic obstructive airways diseases. Renal system: Acute and chronic renal failure.	
3.0		**Haematological Diseases & Nervous system**	**10**
	3.1	**Haematological Diseases:** Iron deficiency, megaloblastic anemia (Vit. B12 and folic acid), sickle cell anemia, thalasemia, hereditary acquired anemia, hemophilia. Endocrine system: Diabetes, thyroid diseases, disorders of sex hormones	
	3.2	**Nervous system:** Epilepsy, Parkinson's disease, stroke, psychiatric disorders: depression, schizophrenia and Alzheimer's disease. Gastrointestinal system: PepticUlcer	
4.0		**Inflammatory bowel diseases, Disease of bones and joints and Cancer**	**8**
	4.1	Inflammatory bowel diseases, jaundice, hepatitis (A, B,C,D,E,F) alcoholic liver disease. **Disease of bones and joints:** Rheumatoid arthritis, osteoporosis and gout. **Principles of cancer:** classification, etiology and pathogenesis of cancer.	
	4.2	**Diseases of bones and joints:** Rheumatoid Arthritis, Osteoporosis, Gout. **Principles of Cancer:** Classification, etiology and pathogenesis of Cancer.	
5.0		**Infectious diseases and Sexually transmitted diseases**	**7**
	5.1	**Infectious diseases:** Meningitis, Typhoid, Leprosy, Tuberculosis Urinary tract infections	
	5.2	**Sexually transmitted diseases:** AIDS, Syphilis, Gonorrhea	

Textbooks

1. Robbins & Cotran Pathologic Basis of Disease – South Asia Edition, Elsevier, 2014.
2. Textbook of Pathology – 6th Edition, Jaypee Publications, 2010.
3. Textbook of Medical Physiology – 12th Edition, WB Saunders Company, 2010.
4. Pharmacotherapy: A Pathophysiological Approach – 9th Edition, McGraw-Hill Medical, 2014.

Reference books

1. Goodman & Gilman's The Pharmacological Basis of Therapeutics – 12th Edition, McGraw-Hill, 2011.
2. Best and Taylor's Physiological Basis of Medical Practice – 12th Edition, Williams and Wilkins, Baltimore, 1991.
3. Davidson's Principles and Practice of Medicine – 21st Edition, Churchill Livingstone, 2010

Internal Assessment (CAI, CAII and CAIII):

1. CAI should be based on first two modules and CAII should be based on next two modules, for 10 marks each.
2. CA III shall be assessed for 5 marks separately

End Semester Examination:

1. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks.
2. The duration of end semester examination shall be two hours.
3. The students need to solve all 5 questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules.

Course code	Course name	Teaching scheme (Hr/week)			Credits assigned		
UCRPC203	Human Anatomy & Physiology II Lab	Theory	Practical	Tutorial	Theory	Practical	Tutorial
		-	4	-	-	2	-

Course code	Course name	Evaluation scheme (In semester)					Semester end exam (SEE)			Total (Marks)
UCRPC203	Human Anatomy & Physiology II Lab	CAI	CAII	CAIII	Total	Internal Assessment*	ESE*	Term work*/ Tutorial	Pract* Oral/ POE	
		-	-	-	-	-	-	25	25	50

Course Description

This practical course provides hands-on training to reinforce theoretical concepts of human anatomy and physiology. Students gain experience through models, charts, specimens, and basic physiological experiments related to major body systems such as reproductive, nervous, endocrine, special senses, and excretory systems. The course emphasizes skill development in observation, experimentation, data recording, and interpretation of physiological functions relevant to clinical and health sciences.

Pre-requisite

Basic knowledge of biology & Human Anatomy and Physiology.

Course Objectives:

1. To develop practical knowledge of anatomical structures using models and specimens.
2. To provide hands-on experience in physiological experiments and demonstrations.
3. To correlate anatomical structures with physiological functions.
4. To train students in recording, analyzing, and interpreting experimental data.
5. To enhance laboratory skills and scientific observation

Course outcomes:

After successful completion of this course, students will able to

CO1 **Identify**[1] anatomical structures of major organ systems using models and specimens

CO2 **Classify**[2] structures and functions of different physiological systems

CO3 **Perform**[3] physiological experiments and record observations accurately

CO4 **Analyze**[4] experimental data and physiological responses

CO5 **Evaluate**[5] normal and abnormal physiological conditions using experimental findings

List of Experiments

Minimum 10 experiments must be performed

1	Study and identification of male reproductive organs using models/charts
2	Study and identification of female reproductive organs & identification of phases of menstrual cycle using models/charts
3	Study and identification of brain and spinal cord using models
4	Identification of cranial nerves using charts/models
5	Demonstration of reflex action (knee jerk reflex)
6	Study and identification of endocrine glands (pituitary, thyroid, pancreas, adrenal)
7	Demonstration of blood glucose estimation using glucometer
8	Study and identification of eye organs.
9	Study and identification of ear organs.
10	Study and identification of kidney and nephron using models
11	Determination of urine pH and specific gravity

Textbooks

1. Practical Physiology – Universities Press.
2. Anatomy and Physiology in Health and Illness – Elsevier Publications.

Reference books

1. Essentials of Medical Physiology – Jaypee Publications.
2. Human Anatomy – CBS Publishers.

Course code	Course name	Teaching scheme (Hr/week)			Credits assigned		
UCRPC205	Computer Application & Biostatistics Lab	Theory	Practical	Tutorial	Theory	Practical	Tutorial
		-	4	-	-	2	-

Course code	Course name	Evaluation scheme (In semester)					Semester end exam (SEE)			Total (Marks)
UCRPC205	Computer Application & Biostatistics Lab	CAI	CAII	CAIII	Total	Internal Assessment*	ESE*	Term work*/ Tutorial	Pract* Oral/ POE	
		-	-	-	-	-	-	25	25	50

Course Description

This laboratory course provides practical exposure to computer applications and biostatistics relevant to healthcare and clinical settings. The course covers operation of computer systems, MS Word, MS Excel, internet applications, hospital information systems, graphical and statistical data presentation, measures of central tendency and dispersion, and statistical analysis using R software. The course develops computational, analytical, and data-handling skills required in healthcare, pharmacy, and research environments.

Pre-requisite

Basic knowledge of mathematics and statistics. Fundamental understanding of computer operations.

Course Objectives:

1. To impart practical knowledge of computer fundamentals and input-output devices.
2. To develop skills in document preparation, spreadsheet handling, and graphical data presentation using MS Office tools.
3. To familiarize students with operating systems, internet applications, and hospital information systems.
4. To train students in statistical data organization, graphical representation, and computation of statistical measures.
5. To develop analytical and computational skills using statistical tools and R software.

Course outcomes:

After successful completion of this course, students will able to

CO1 **Identify**[2] computer components, operating systems, and internet applications used in healthcare environments.

CO2 **Perform**[3] document preparation, spreadsheet management, and graphical data presentation using MS Word and MS Excel.

CO3 **Utilize**[4] hospital information systems and medical data handling procedures in clinical settings.

CO4 **Construct**[3] statistical tables, graphs, and frequency distributions for healthcare data.

CO5 **Analyze**[4] measures of central tendency and dispersion using manual methods and R software.

List of Experiments

Minimum 10 experiments must be performed

1	Study of basic computer components and input-output devices
2	Creation, editing, formatting, and saving documents using MS Word
3	Preparation of tables, reports, and templates using MS Word
4	Creation of worksheets, formulas, and formatting using MS Excel
5	Preparation of graphs and charts using MS Excel
6	Study of operating systems and file management operations
7	Demonstration of internet applications including E-mail, FTP, Telnet, and WWW
8	Demonstration of Hospital Information Systems and medical data formats
9	Construction of discrete and continuous frequency distributions
10	Construction of bar diagrams, histograms, pie charts, frequency curves, and frequency polygons
11	Calculation of measures of central tendency and positional averages for grouped and ungrouped data
12	Calculation of measures of dispersion and statistical analysis using R software
13	Definition, formula, and calculation of quartiles, deciles, and percentiles for grouped and ungrouped data.

Textbooks

1. Mausner &Bahn: Epidemiology-An Introductory text, 2nd Ed.,W.B.Saunders Co.
2. Richard F. Morton &J. Richard Hebd: A study guide to Epidemiology and Biostatistics. 2nd Ed., University Park Press, Baltimore.
3. Practicals in Statistics, by Dr. H. L. Sharma.
4. Experimental Designs and Survey Sampling: Methods and Applications, by H. L. Sharma.

Reference books

1. Sylvia W Smoller, J Smoller, Biostatistics & Epidemiology A Primer for health and Biomedical professionals, 4th edition, Springs, 2015
2. *Introduction to statistical data analysis with R* by Matthias Kohl, bookboon.com, London, 2015.

Evaluation Scheme

1. Term work assessment shall be based on the overall performance of the student with every assignment graded from time to time.
2. The grades will be converted to marks as per ‘credit and grading system’ manual and should be added and averaged.
3. Based on above scheme grading and Term work assessment should be done.
4. OE/POE shall be based on all Term work and work carried out during semester.

Course code	Course name	Teaching scheme (Hr/week)			Credits assigned		
UHSAE001	Professional Communication	Theory	Practical	Tutorial	Theory	Practical	Tutorial
		1	2	-	2	-	-

Course code	Course name	Evaluation scheme (In semester)					Semester end exam (SEE)		Total (Marks)
UHSAE001	Professional Communication	CAI	CAII	CAIII	Total	Min pass	Marks	Min pass	
		-	10	5	15	40%	35	40%	50

Course Description

This course is designed to develop the English Communicative capacity required in social and professional life. The students will excel in professional communication that will help them in the academia and the world of practical affairs.

Course Objectives:

1. To acquaint learners with the process of communication.
2. To train learners to effectively apply LSRW skills in professional life.

Course outcomes:

After successful completion of this course, students will able to

CO1 Identify the importance of communication in formal situations.

CO2 Analyze the process and forms of communication.

CO3 Apply LSRW skills for effective communication in professional life.

Module	Unit	Description	Hours
1.0		**Communication Theory**	**3**
	1.1	Communication: Concept and Its Meaning, Process, Types: Verbal and Non-verbal Communication,	
	1.2	Use of Body Language in Communication and Grooming,	
	1.3	Levels and Networks of Communication: Formal and Informal,	
	1.4	Flows of Communication, Barriers to Communication, ways to overcome different barriers, and Technology in Communication.	
2.0		**Listening Skills**	**3**
	2.1	Importance of effective Listening, Listening and Hearing	
	2.2	Process of Listening, Barriers to Effective Listening	
	2.3	Types of Listening, Techniques of effective Listening	
3.0		**Speaking Skills**	**3**
	3.1	Public Speaking styles: ceremonial, persuasive, demonstrative and informative speaking.	
	3.2	Public Speaking Techniques, Elements of Public Speaking	
	3.3	Extempore and Prepared Speech, Group Discussion: GD Types, Skills, Do's Don'ts. Roles in GD, Debate,	
4.0		**Reading Skills**	**3**
	4.1	Types of reading	
	4.2	Techniques for effective Reading	
	4.3	SQ3R Technique	
5.0		**Writing Skills**	**3**
	5.1	Seven C's of Communication	
	5.2	Business Letters, Types of Business Letters	
	5.3	Cover Letter & Résumé	

Note: Practical and/or Tutorial will be conducted based on the above content.

Text Book:

1. Chadha, R.K., Communication Techniques and Skills, Dhanpat Rai Publications, 2014

References:

1. Raymond Murphy, Essential English Grammar: A Self-Study Reference and Practice Book for Elementary Students of English with Answers, Cambridge University Press
2. Green, David. Contemporary English Grammar –Structures and Composition. MacMillan India. 2014 (Print)
3. Fitikides, T. J. *Common Mistakes in English*. London: Orient Longman, 1984.
4. Technical Writing & Professional Communication for non-native speakers of English by Thomas N. Huckin& Leslie A. Olsen, McGraw –Hill.
5. Mastering Communication by Nicky Stanton, Palgrave Master Series
6. Meenakshi Raman & Sangita Sharma, Technical Communication; Principles and Practice, Oxford University Press.
7. M Ashraf Rizvi, Effective Technical Communication, Tata McGraw-Hill Education
8. Martin Hewings. Advanced Grammar in Use. Cambridge University Press, 2013.
9. Michael Swan. Practical English Usage. 3rd ed. OUP, 2005.
10. John Seely. The Oxford Guide to Effective Writing and Speaking. OUP, 200

Websites:

http://esl.about.com/od/englishtestsandquizzes/

https://learnenglish.britishcouncil.org/en/content

https://www.englishclub.com/grammar/quizzes.htm

https://englishdost.com/blog/language-learning-perfect-solution/

https://englishdost.com/blog/category/english-for-beginners/

http://www.selfgrowth.com/comm.html

Internal Assessment (CA I, CA II, CA III):

1. CA II will be based on all the modules.
2. CA III will be assessed for 5 marks separately.

Practical and/or Tutorial:

1. Practical and/or Tutorial will be based on the content in the course.
2. This will be continuously evaluated throughout the semester.

Course code	Course name	Teaching scheme (Hr/week)			Credits assigned		
USTVE004	Environmental Science & Sustainability	Theory	Practical	Tutorial	Theory	Practical	Tutorial
		2	-	-	2	-	-

Course code	Course name	Evaluation scheme (In semester)					Semester end exam (SEE)		Total (Marks)
USTVE004	Environmental Science & Sustainability	CAI	CAII	CAIII	Total	Min pass	Marks	Min pass	
		-	10	5	15	40%	35	40%	50

Course Objectives:

To provide a general understanding of our environment, problems during exploitation of natural resources, the importance of biodiversity and the need for its conservation, pollution and its impacts, and approaches for environment sustainability.

Course outcomes

After successful completion of this course, students will able to

CO1 **Illustrate** the scope and significance of environmental science and evaluate the role of individuals in achieving sustainable development.

CO2 **Classify** and explain natural resources, ecosystem structure and functions, including energy flow, food chains, and ecological balance.

CO3 **Evaluate** biodiversity, its levels, values, and threats, and recommend appropriate conservation strategies with reference to India.

CO4 **Interpret** the causes, impacts, and control measures of environmental pollution and climate change, including waste management practices.

CO5 **Analyze** environmental policies, laws, global initiatives, and sustainability practices, and apply them to real-life environmental management and green development.

Module	Unit	Description	Hours
1.0		**Foundations and Importance of Environmental Science**	**6**
	1.1	Multidisciplinary nature of environmental science; scope and importance; need for environmental awareness, Renewable and non-renewable resources, United Nations Conference on the Human Environment 1972; World Commission on Environment and Development and concept of sustainable development, Role of individuals in environmental protection.	
2.0		**Natural Resources, Ecosystems and Biodiversity**	**6**
	2.1	**Natural Resources:** land degradation, soil erosion, desertification, Water resources (floods, droughts, conservation); forest resources and deforestation, Alternative energy resources: solar, wind, biomass, hydropower, geothermal and tidal.	
	2.2	**Ecosystem and Biodiversity:** Structure and function of ecosystems; types (terrestrial and aquatic), Food chain, food web, ecological pyramids and energy flow. Biodiversity: concept, values and levels, India as a mega-diverse nation; threats and conservation methods (in-situ and ex-situ).	
3.0		**Environmental Pollution and Climate Change**	**6**
	3.1	Types, causes, effects and control of air, water and soil pollution, Solid waste management: municipal waste, biomedical waste, e-waste, plastic pollution and microplastics.	
4.0		**Environmental Governance and Legal Framework**	**6**
	4.1	Environment Protection Act, Air (Prevention & Control of Pollution) Act, Water (Prevention & Control of Pollution) Act, Wildlife Protection Act, Environmental Impact Assessment (EIA), Environmental Management System (ISO 14001), Environmental audit.	
	4.2	**Environmental Treaties and Legislation:** Major International organizations and initiatives: United Nations Environment Programme (UNEP), International Union for Conservation of Nature (IUCN) and Intergovernmental Union panel on climate change (IPCC)	
5.0		**Sustainability and Green Development Practices**	**6**
	5.1	**Sustainable Development:** Concept and pillars of sustainable development; Sustainable Development Goals (SDGs). Carbon footprint and sustainable resource use.	
	5.2	**Green Practices and Movements:** Green technology, green buildings, Eco-labeling, Green business, Environmental movements: Chipko Movement, Silent Valley Movement, Bishnoi community and Bhopal Gas Disaster.	
	5.3	Documentation of campus biodiversity.	
	5.4	Campus environmental management activities such as solid waste disposal, water management, and sewage treatment.	

Textbooks

1. Anubha Kaushik and C.P. Kaushik (2004) “Perspective of Environmental Studies”
2. Dr P. D. Raut (2021) “Environmental Studies”, Seventh Edition

Reference books

1 . Eldon D. Enger (2016) “Environmental Science: A study of interrelationships”
2 . Jennifer A. Elliot (2012) “An Introduction to Sustainable Development”, 4th Edition

Internal Assessment (CAII and CAIII):

1. CAII should be based on two modules, for 10 marks each.
2. Fifth module (CA III) shall be assessed for 5 marks separately.

End Semester Examination:

1. Question paper will comprise of 5 questions, each carrying 7 marks.
2. The duration of end semester examination shall be 2 hours.
3. The students need to solve all 5 questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules.

List of Co-curricular courses I & II	
Course Code	**Course Name**
UISCC011	National Service Scheme
UISCC012	Regular and Special NSS Camp Activity
UISCC021	Indian Music
UISCC022	Fine Arts
UISCC023	Indian Dance
UISCC031	Physical Fitness
UISCC032	Yoga & Meditation

Open Elective I				
No.	**Course Code**	**Course**	**Faculty/School /Department**	**Credits**
1	UAEOE011	Basic Aeronautical Engineering	Department of Aerospace Engg.	2
2	UAIOE011	Software Models	Department of AIML	2
3	UCEOE011	Advanced Building Materials	Department of Civil Engg.	2
4	UCSOE011	Introduction to Latex	Department of Comp. Sc. & Engg.	2
5	UECOE011	Semiconductor Devices	Department of Elect. & Comm. Engg.	2
6	UCAOE012	Python Programming	School of Computer Applications	2
7	UPHOE011	World of Nano Science	School of Physical & Chemical Sciences	2
8	UFSOE012	Basics of Food Processing	Department of Food Science & Technology	2
9	UDCOE011	Selling Skills	Department of Commerce	2
10	UBAOE011	Basics of Marketing	Department of Management	2
11	UAROE011	Introduction To GIS	Department of Social Sciences	2
12	UAROE012	Applied Communicative English	Department of Social Sciences	2
13	UBTOE011	Introduction to Biotechnology	Department of Bio Technology	2
Open Elective II				
1	UAEOE021	Aircraft Systems and Instruments	Department of Aerospace Engg.	2
2	UAIOE021	Introduction to Python	Department of AIML	2
3	UCEOE021	Green Building	Department of Civil Engg.	2
4	UCSOE021	Advance Microsoft Office	Department of Comp. Sc. & Engg.	2
5	UECOE021	Fundamentals of Communication Engineering	Department of Elect. & Comm. Engg.	2
6	UCAOE022	Data Analytics Tools	School of Computer Applications	2
7	UPHOE021	Wonders in Nanotechnology	School of Physical & Chemical Sciences	2
8	UFSOE022	Bakery and Confectionary Skills	Department of Food Science & Technology	2
9	UDCOE021	Financial Literacy	Department of Commerce	2
10	UBAOE021	Export- Import Documentation and Procedures	Department of Management	2
11	UAROE021	Tourism & Travel Management	Department of Social Sciences	2
12	UAROE022	Language Analytics	Department of Social Sciences	2
13	UBTOE021	Basics in Bioinformatics	Department of Bio Technology	2
Open Elective III				
1	UAEOE031	Unmanned Aerial Vehicle	Department of Aerospace Engg.	2
2	UAIOE031	Introduction to Data Analytics	Department of AIML	2
3	UCEOE031	Disaster Management & Mitigation	Department of Civil Engg.	2
4	UCSOE031	Fundamental of C Programming	Department of Comp. Sc. & Engg.	2
5	UECOE031	Automotive Electronics	Department of Elect. & Comm. Engg.	2
6	UCAOE032	Data Visualization Techniques using Tableau	School of Computer Applications	2
7	UCHOE031	Green Chemistry & Sustainability	School of Physical & Chemical Sciences	2
8	UFSOE032	Basics of Food Adulteration	Department of Food Science & Technology	2
9	UDCOE031	Personal Financial Planning	Department of Commerce	2
10	UBAOE031	Event Management	Department of Management	2
11	UAROE031	English for Competitive Examinations	Department of Social Sciences	2
12	UAIOE032	Agentic AI	Department of AIML	2
13	UBTOE031	Microbial World and Its Applications	Department of Bio Technology	2

Note: For details of Syllabus, Teaching and Evaluation scheme, please refer to the structure and syllabus of respective departments.

For B. Sc. Programs

MDM Track: Biotechnology for Health Industry

Course code	Course name	Credits
UBTMM011	Basics in Biotechnology	2
UBTMM021	Biotechnology in Food and Nutritional Sciences	3
UBTMM022	Biotechnology in Food and Nutritional Sciences Lab	1
UBTMM033	Biotechnology in Healthcare	2
UBTMM032	Biotechnology in Healthcare Lab	1
UBTMM043	Industrial Biotechnology	2
UBTMM042	Industrial Biotechnology Lab	1
	Total	**12**

MDM Track: Translational Biotechnology

Course code	Course name	Credits
UBTMM012	Biomolecules & Cellular Systems	2
UBTMM013	Biomolecules & Cell Biology Lab	1
UBTMM023	Immunology, Diagnostics & Clinical Applications	2
UBTMM024	Immunology & Clinical Techniques Lab	1
UBTMM034	Microbial Science & Industrial Applications	2
UBTMM035	Microbiology & Fermentation Lab	1
UBTMM044	Bioanalytical Techniques & Bioinformatics	2
UBTMM045	Analytical & Bioinformatics Lab	1
	Total	**12**

MDM Track: Data Science and Analytics

Course code	Course name	Credits
UCAMM021	Statistical Computing	2
UCAMM027	Statistical Computing Lab	1
UCAMM031	Python for Data Science	2
UCAMM037	Python for Data Science Lab	1
UCAMM041	Foundation Skills of Machine Learning	2
UCAMM047	Foundation Skills of Machine Learning Lab	1
UCAMM051	Predictive Modelling and Analytics	2
UCAMM051	Predictive Modelling and Analytics Lab	1
	Total	**12**

MDM Track: Food Science and Technology

Course code	Course name	Credits
UFSMM012	Fundamentals of Food Science	2
UFSMM013	Fundamentals of Food Science Lab	1
UFSMM023	Processing of Fruits and Vegetables	2
UFSMM024	Processing of Fruits and Vegetables Lab	1
UFSMM033	Basics in Dairy Sciences	2
UFSMM034	Basics in Dairy Sciences Lab	1
UFSMM043	Fundamentals of Bakery Science	2
UFSMM044	Fundamentals of Bakery Science Lab	1
	Total	**12**