



# **SRI RAMACHANDRA UNIVERSITY**

(Declared under Section 3 of the UGC Act, 1956)

**Accredited by NAAC with 'A' Grade**

**Porur, Chennai 600 116**

## **CHOICE BASED CREDIT SYSTEM (CBCS) SYLLABI FOR UG AND PG DEGREE PROGRAMS**

**2015-16**

**COMMON CORE & DISCIPLINE SPECIFIC ELECTIVE COURSES**

List of Common CORE/ AE Courses for CBCS Programs, 2016

S. No	Code Number	Course Title	Category : CT/ DE/ GE/ SE/ AE	Credit	Faculty	Offering Department	Level UG/PG/II D / Ph.D	Semester Offered	Course Codes	RG	Program taking
1	MAE 001	BASICS OF RESEARCH METHODOLOGY	AE	2	SRMC&RI / AHS /BMST&R	Community Medicine / EHE/ Bioinformatics	UG	3	USS 15AE 211		AUSS
			AE	2	SRMC&RI / AHS /BMST&R	Community Medicine / EHE/ Bioinformatics	UG	5	UAH15AE307		AUAH (ALL SPECILIZATIONS)
2	MAE 002	BASICS OF BIOSTATISTICS	AE	2	SRMC&RI / AHS /BMST&R	Community Medicine / EHE/ Bioinformatics	UG	5	UAH15AE309		AUAH (ALL SPECILIZATIONS)
			AE	2			UG	5	USS 15AE 309		AUSS
3	MAE 003	RESEARCH METHODOLOGY	AE	2	SRMC&RI	Community Medicine	PG	2	PEC15AE108	oID AAE008 SYLLABUS REVISED	APEC
		RESEARCH METHODOLOGY	AE	2	BMST&R	Human Genetics	PG	3	PHG15AE211		BPHG
4	MAE 004	BIOSTATISTICS	AE	2	SRMC & RI/ AHS / BMST&R	CM	PG	1	PHG15AE111		BPHG
5	AAE005	TRAUMA CARE LIFE SUPPORT	AE	2	AHS	ETC	UG	6	UAH15AE308		AUAH(ALL SPECILIZATIONS)

							PG	4	PMI15AE208		APMI
							PG	4	PNS15AE208		APNS
<b>* Syllabus Year Specific Coding for Courses of 2016 Onwards.</b>											
6	AAE006	CARDIAC CARE LIFE SUPPORT	AE	2	AHS	ETC	UG	6	UAH15AE310		AUAH(ALL SPECILIZATIONS)
							PG	4	PNS15AE206		APNS
							PG	4	PMI15AE206		APMI
7	AAE007	Community Medicine	AE	2	SRMC & RI	Community Medicine /	UG	2	UAH15AE114		AUAH; AIMR
			AE	2	SRMC & RI	Community Medicine /	UG	2	UTC15AE116		AUTC
			AE	2	SRMC & RI	Community Medicine /	UG	2	USS15AE114		AUSS
	UPT15CT307	Community Medicine	CT	3		Community Medicine /	UG	5	UPT15CT307		TUPT
8	AAE010	Medical Ethics & Law	AE	2	SRMC&RI / AHS/ BMST&R	Community Medicine/ General Medicine/ Forensic Medicine	UG	6	UAH15AE306		AUAH(ALL SPECILIZATIONS)
9	MCL001	ANATOMY (PRACTICALS)	CL	2	SRMC&RI	Anatomy	UG	1	UAH15CL151	a	AUAH; AIMR
				2				1	USS 15CL 151	a	AUSS
				1				1	UTC 15CL 151	a	AUTC
				1				1	UBM15DL 157	NOT GROU PED	BUBM
10	MCL002	PHYSIOLOGY (PRACTICALS)	CL	2	SRMC&RI	Physiology	UG	1	UAH15CL153	b	AUAH; AIMR
				2				1	USS15CL153	b	AUSS
				1				1	UTC15CL153	b	AUTC

11	MCL003	BIOCHEMISTRY (PRACTICALS)	CL	2	SRMC&RI	Biochemistry	UG	1	UAH15CL155	c	AUAH; AIMR
				1				1	USS15CL155	c	AUSS
				1				1	UTC15CL155	c	AUTC
12	MCL004	PATHOLOGY (PRACTICALS)	CL	1	SRMC&RI	Pathology	UG	2	UAH15CL154	e	AUAH; AIMR
				1				2	USS15CL154	e	AUSS
13	MCL005	PHARMACOLOGY (PRACTICALS)	CL	1	SRMC&RI	Pharmacology	UG	2	UAH15CL156	f	AUAH; AIMR
				1				2	UTC15CL152	f	AUTC
14	MCL006	MICROBIOLOGY (PRACTICALS)	CL	1	SRMC&RI	Microbiology	UG	2	UAH15CL152	d	AUAH; AIMR
15	MCT001	ANATOMY	CT	4	SRMC&RI	Anatomy	UG	1	UAH15CT101	a	AUAH; AIMR
				4				1	USS15CT 101	a	AUSS
				4				1	UTC15CT 101	a	AUTC
				3				1	UBM15DE107	NOT GRP	BUBM
			General & Ocular Anatomy ** Syllabus provided in AUOP program	CT	4				1	UOP15CT101	ONLY FOR EXAM, NO LAB
16	MCT002	PHYSIOLOGY	CT	4	SRMC&RI	Physiology	UG	1	UAH15CT103	B	AUAH; AIMR
				4				1	USS15CT103	B	AUSS
				4				1	UTC15CT103	B	AUTC
				4				1	UOP15CT103	NO LAB	AUOP
17	MCT003	BIOCHEMISTRY	CT	4	SRMC &RI	Biochemistry	UG	1	UAH15CT105	c	AUAH; AIMR
				4				1	USS15CT105	c	AUSS

				4				1	UTC15CT105	c	AUTC
				4				1	UOP15CT107	NO LAB	AUOP
				3				2	UPT15DE108		TUPT
18	MCT004	PATHOLOGY	CT	3	SRMC&RI	Pathology	UG	2	UAH15CT104	e	AUAH; AIMR
								2	USS15CT104	e	AUSS
								2	UOP15CT104	NO LAB	AUOP
								2	UTC15DE110		AUTC
19	MCT005	PHARMACOLOGY	CT	3	SRMC&RI	Pharmacology	UG	2	UAH15CT106	f	AUAH; AIMR
				3	SRMC&RI		UG	2	UTC15CT102	f	AUTC
				3	SRMC&RI		UG	4	UOP15CT212	f	AUOP
20	MCT006	MICROBIOLOGY	CT	3	SRMC&RI	Microbiology	UG	2	UAH15CT102	d	AUAH; AIMR
				3				2	UOP15CT102		AUOP
21	MCT007	BASICS OF MEDICAL SCIENCES	CT	4	SRMC&RI	MANAGEMENT	UG	1	UHS15CT107		GUHS
				4			UG	1	UNT15CT101		AUNT
22	MCT008	Basics of research Methodology & Biostatistics	CT	4	SRMC&RI / AHS/ BMST&R	Community Medicine / EHE/ Bioinformatics	UG	4	UOP15CT208		AUOP
				4			UG	5	UNT15CT301		AUNT
				4			UG	7	UPT15CT407		TUPT
23	MCT009	Introduction to Basic Medical Science	CT	4	SRMC&RI	COMMUNITY MEDICINE Depts.	PG	1	PHM15CT113		GPHM
				4				1	PBI15CT101		BPBI

24	MCT010	RESEARCH METHODOLOGY & BIOSTATISTICS	CT	4	SRMC&RI / AHS/ BMST&R	Community Medicine / EHE/ Bioinformatics	PG/ I	6	IMR15CT308		AIMR
			CT	4			PG	2	PCN15CT104		APCN
			CT	4			PG	2	PMI15CT108		APMI
			CT	4			PG	2	PML15CT108		APML
			CT	4			PG	2	PNS15CT108		APNS
			CT	4			PG	2	PRS15CT110		APRS
			CT	4			PG	1	PMT15CT103		TPCS
			CT	4			PG	1	PMT15CT103		TPNU
			CT	4			PG	1	PMT15CT103		TPOT
			CT	4			PG	1	PMT15CT103		TPOG

**Basics of Research Methodology**

<b>Offered by Department of</b> Community Medicine/ EHE/ Bioinformatics								
<b>Course Number</b>	<b>Course Code</b>	<b>Course Title</b>	<b>RG</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Semester</b>
MAE001	USS15AE211	Basics of Research	-	2	-	-	2	3
	UAH15AE307	Methodology	-	2	-	-	2	5
<b>Offered to UG Programs of AUSS, AUAH(ALL SPECIALIZATIONS)</b>								

**Learning Objectives:****Learning Outcomes:****UNIT I:**

Introduction to the Process of Conducting Research: Introduction, Steps in the Process of Research, Identifying a hypothesis and/or research problem, specifying a purpose,

**UNIT II:**

Research Designs, Creating research questions, Review of literature, Ethics of research and informed consent, Research proposal writing & Components of Research paper.

**UNIT III:**

Introduction to Qualitative, Quantitative and Mixed methods Research: Essence of Qualitative Data, Sampling, Collection Techniques, Biography.

**UNIT IV:**

Essence of Quantitative Data, Collection and Analysis Techniques, Choosing a good instrument, Interval and Ratio Scales, Validity and Reliability, Essence of Mixed Methods, Advantages, Design Components, Explanatory Mixed Methods Frameworks.

**UNIT V:**

Epidemiological Methods: Measuring disease frequency, Descriptive and analytical studies-observational and experimental studies and Biases in Epidemiological Studies.

**Text Books :**

- Research Methods: Methods and Techniques by Kothari CR. New Age International Publishers- 2004
- Research Methodology: A step by Step Guide to Beginners by Ranjit Kumar. SAGE Publishers-2014.
- Research Methods by Pannerselvam R. PHI Learning Pvt Ltd-2013
- Becoming Quantitative Researchers- An Introduction by Glesne C. Pearson Publishers-2015
- Research Methods by Rajendra Kumar. APH Publishers-2008

**Basics of Biostatistics**

Offered by Department of Community Medicine/ EHE/ Bioinformatics								
Course Number	Course Code	Course Title	RG	L	T	P	C	Semester
MAE002	UAH15AE309 USS15AE309	Basics of Biostatistics	-	2	-	-	-	5
Offered to UG Programs of AUSS, AUAH (ALL SPECIALIZATIONS)								

**UNIT I:**

Introduction to Probability, distributions and sampling: Probability, addition and multiplicative theorems, problems, Probability distribution Binomial, Poisson, Normal, Applications to health sciences, Sampling methods, uses of sampling, Sample size.

**UNIT II:**

Introduction to Descriptive Statistics: Introduction, Summarizing and describing a collection of data, Univariate and bivariate analysis, Mean, mode and standard deviation,

**UNIT III:**

Percentages and Ratios, Histograms, Identifying randomness and uncertainty in data, Summarizing biological data, Identifying the dependent and independent variables, Confidence levels

**UNIT IV:**

Introduction to Inferential Statistics: Drawing inference from data, Estimation, Testing of hypothesis, Type I & type II errors, power and p-value, Modeling assumptions, Identifying Patterns, Regression analysis, t-test, Analysis of Variance, Correlations, Chi-square, Non-parametric tests

**UNIT V:**



Epidemiological Methods: Measuring disease frequency, Descriptive and analytical studies-observational and experimental studies and Biases in Epidemiological Studies.

**Text Books :**

- Introduction to Biostatistics and Research Methods by Sunder Rao PSS Y Richard J . PHI publishers 2012.
- Biostatistics: A Foundation for Analysis of Health Sciences by Danial WW. John Wiley Publishers.
- Primer of Biostatistics by Galantz SA. McGraw Hill Press, 2011
- Essentials of Medical Statistics by Kirkwood BR and Sterne JAC. Blackwell Publishers
- Fundamentals of Biostatistics by Rosner B & Rosner R. Cergage Learning Inc. 2010

**Research Methodology**

Offered by Department of Community Medicine/ EHE/ Bioinformatics/ HG								
Course Number	Course Code	Course Title	RG	L	T	P	C	Semester
MAE003	PEC15AE108	Research Methodology	-	2	-	-	2	2
	PHG15AE211		-	2	-	-	2	3
Offered to PG Programs of APEC, BPHG								

**Learning Objectives:**

**Learning Outcomes:**

**UNIT I:**

**Introduction to Research:** The hallmarks of scientific research – Building blocks of science in research – Concept of Applied and Basic research – Quantitative and Qualitative Research Techniques – Need for theoretical frame work – Hypothesis development for Quantitative and Quantitative Data, Research Design – Purpose of the study: Exploratory, Descriptive, Research Ethics, Report Writing.

**UNIT II:**

**Data Collection Methods -1:** Interviewing, Questionnaires, etc. Secondary sources of data collection, Guidelines for Questionnaire Design – Electronic Questionnaire Design and Surveys. Static and Dynamic panels.

**UNIT III:**

**Data Collection Methods -2:** Measurement of variables – Scales and measurements, Developing scales – Rating scale and attitudinal scales – Validity testing of scales – Reliability concept being developed in scales, Sampling Techniques – Probabilistic and non-probabilistic samples. Issues of Precision and Confidence in determining Sample Size, Optimal sample size. Statistical

Softwares

**UNIT IV:**

**Epidemiological Methods:** Definition and scope, Health and Disease, Measures used in Epidemiology, Epidemiological Study Designs, Biases, Uses of Epidemiology, Surveillance

**UNIT V:**

**Laboratory Experimental Designs:** Basic laboratory Designs– Completely Randomized Design, Randomized Block Designs, Latin Square Design, Incomplete Block Designs, Crossover and Factorial Designs (only applications).

**Text Books :**

- 1) McBurney, DH: Research Methods, Thomson Asia Pvt. Ltd. Singapore, 2002.
- 2) Cooper DR and Schindler RS: Research Methods, Tata McGraw- Hill Publishing Company Limited, 2000
- 3) Ticehurst GW and Veal AJ: Business Research Methods, Longman, 1999.
- 4) Kothari CR: Research Methods: Methods and Techniques New Age International Publishers- 2004
- 5) Ranjit Kumar Research Methodology: A step by Step Guide to Beginners. SAGE Publishers-2014.
- 6) Pannerselvam R : Research Methods by. PHI Learning Pvt Ltd-2013.

**Biostatistics**

Offered by Department of Community Medicine								
Course Number	Course Code	Course Title	RG	L	T	P	C	Semester
MAE004	PHG15AE111	Biostatistics	-	2	-	-	2	1
Offered to PG Program of BPHG								

**Learning Objectives:**

**Learning Outcomes:**

**UNIT I:**

Biostatistical Concepts Role of Biostatistics in Research, Descriptive Statistics, Random Variable, Expected Value and Variance.

**Unit II:**

Probability theory- Laws of probability, Bayes theorem, Distributions- Discrete and Continuous - Binomial, Poisson, Negative binomial, geometric, hyper geometric, uniform, exponential, normal, log normal, gamma.

**UNIT III:**

Correlation and Regression, Partial and Multiple Correlations, Multiple Linear Regression, Logistic Regression, Poisson Regression (only applications)

**UNIT IV:**

Statistical Inference, Estimation and testing of hypothesis, Types of errors, Power, p-value, Confidence Interval, t-test, Z test, ANOVA, Chi-square and other Nonparametric tests,

**UNIT V:**

Multivariate methods-Factor Analysis, Principal Component and Partial Least Square, Cluster Analysis – Discriminant Analysis, Canonical correlations (only application).

**Text Books:**

- 1) Danial WW, Biostatistics: A Foundation for Analysis of Health Sciences, John Wiley Publishers-2009
- 2) Kirkwood BR and Sterne JAC: Essentials of Medical Statistics , Blackwell Publishers,2003
- 3) Rosner B & Rosner R: Fundamentals of Biostatistics by. Cergage Learning Inc. 2010
- 4) Flick U. Introducing Research Methodology- A Beginners Guide to Doing a Project Sage Publishers, 2011.
- 5) Glantz SA: Primer of Biostatistics, McGraw Hill Publishers, 2011
- 6) Indrayan A: Medical Biostatistics, Chapman and Hall/CRC, 2012
- 7) Baldi B and Moore DS: The Practice of Statistics in Life Sciences, W.H. Freeman Publishers, 2014

**Anatomy**

Offered by Department of Anatomy								
Course Number	Course Code	Course Title	RG	L	T	P	C	Semester
MCT001	UAH15CT101 USS15CT101 UTC15CT101	Anatomy	a	4	-	-	4	1
	UOP15CT101		-	4	-	-	4	1
	UBM15DE107		-	3	-	-	3	1

MCL001	UAH15CL151 USS15CL151	Anatomy Lab	a	-	-	2	2	1
	UTC15CL151		a	-	-	1	1	1
	UBM15DL157		-	-	-	1	1	1
<b>Offered to UG Program</b> of AUHS, AIMR, Sports & Exercise Sciences , Optometry and Trauma Care Management								

**Course description:**

- A study of the anatomical structure of the human body.
- Body structure will be studied by organ systems.
- Form-function relationships with emphasis on clinically relevant anatomy.
- The laboratory study will involve observing and learning from human skeletal collections and dissected cadavers and preserved specimens.

**Objectives:****At the end of the course the student should be able to:**

- Describe the structure and functions of the organ systems of the human body.
- Describe how the organ systems function and interrelate.
- Learn basic technical terminology and language associated with anatomy.
- Develop a self-identity of what it means to be “human”.

**Learning Objectives: Skills**

- Identify the anatomical structure in the dissected specimen.
- Learn to correlate anatomical structures with relevant clinical conditions.

**Contents****Unit I: Organization of the Human Body**

Introduction to the human body - Definition and subdivisions of anatomy- Anatomical position and terminology Regions and Systems of the body -Cavities of the body and their contents - Levels of organization of the body.

Cell – Definition of a cell, shapes and sizes of cells - Parts of a cell – cell membranes cytoplasm, subcellular organelles and their main functions. Cell Division – Definition and main events that occur in different stages of mitosis and meiosis.

Tissues – Tissues of the body - Definition and types of basic tissues - Characteristics, functions and locations of different types of tissues.

## **Unit II : Systems of Support and Movement**

### **1. Skeletal system**

Skeleton – Definition, axial and appendicular skeleton with names and number of bones, Types of bones. Parts of bones. Functions of bones. Name location and general features of the bones of the body.

Joints – Definition and types of joints with examples. Axes and kind of movements possible. Name, location, type, bones forming, movements possible.

### **2. Muscular system**

Parts of the skeletal muscle. Definition of origin and insertion. Name and location of the skeletal muscles of the body. Origin, insertion, nerve supply and action of large muscles like sternocleidomastoid, pectoralis major, deltoid, Biceps brachii, Triceps brachii, gluteus, gastrocnemius and diaphragm.

## **Unit III : Control Systems of the Body**

### **1. Nervous system**

Sub-divisions of the nervous system , Spinal cord – Location, extent, spinal segments, external features and internal structure.

Brain – Sub-divisions, location external features of medulla oblongata, pons, mid-brain, cerebellum and cerebrum. Meninges and spaces around them. Name and location of ventricles of brain and circulation of cerebrospinal fluid. Blood supply of the brain and spinal cord.

Cranial nerves - Name, number, location and general distribution.

Spinal nerves - Typical spinal nerve groups and number of spinal nerves. Name and location of cervical plexus and brachial plexus. Location and general distribution of the branches.

Autonomic Nervous system – definition and functions

### **2. Sense organs**

Location and features of the nose, tongue, eye, ear and skin

### **3. Endocrine system**

Names of the endocrine glands. Location and features of pituitary, thyroid, parathyroid, suprarenal, pancreas, ovaries and testes. Names of hormones produced by each gland.

## **Unit IV : Maintenance of the Human Body**

### **1. Cardio-vascular system**

Types and general structure of blood vessels. Structure and types of arteries and veins. Structure of capillaries. Shape, size, location, coverings, external and internal features of heart. Structure of heart wall, conducting system of the heart. Blood supply of the heart.

The systemic arteries and veins. Name, location, branches and main-distribution of principal arteries and veins.

## **2. Lymphatic system**

Lymph, lymphatic vessels, name, location and features of the lymphatic organs.

## **3. Respiratory system**

Names of organs of respiration, Location and features of nose, pharynx, larynx, trachea, bronchi, lungs and pleura.

### **Unit V:**

#### **1. Digestive system**

Names of organs of digestion. Parts of alimentary canal and accessory organs. Location and features of mouth, pharynx, esophagus, stomach, small and large intestines. Location and features of salivary glands, pancreas, liver and gall bladder.

#### **2. Urinary system**

Names of urinary organs, location and features of kidney, ureter, urinary bladder and urethra.

### **Unit VI:**

#### **1. Reproductive system**

Names of male and female organs of reproduction. Location and features of scrotum, testis, epididymis, vas deferens, seminal vesicle, ejaculatory duct, prostate gland, penis and spermatic cord. Location and features of uterus and its supports, uterine tube, ovary vagina vulva and breast.

#### **Anatomical Regions**

Simple ideas about scalp, triangles of neck, axilla, cubital fossa, mediastinum, inguinal canal, femoral triangle, popliteal fossa.

### **Practicals and Demonstrations**

1. Demonstration of dissected specimens.

#### **Recommended books:**

1. Ross and Wilson: Anatomy and Physiology in health and illness
2. B D Chaurasia: General human anatomy

**References:**

1. B D Chaurasia: Regional Anatomy. Vol I, II,III
2. Richard S. Snell: Clinical Anatomy

**Online reference:**

1. <http://study.com/academy/course/anatomy-physiology-course.html>
2. <https://oli.cmu.edu/jcourse/lms/students/syllabus.do?section=434867c180020ca600dec7797edc76be>

**Practical examination scheme ( for 50 marks)**

Registration no	Spotters 15 x 2 marks = 30 marks	Gross anatomy viva 10 marks	Osteology Viva 10 marks	TOTAL 50 marks

**Physiology**

Offered by Department of Physiology								
Course Number	Course Code	Course Title	RG	L	T	P	C	Semester
MCT002	UAH15CT103 USS15CT103 UTC15CT103	Physiology	b	4	-	-	4	1
	UOP15CT103		-	4	-	-	4	1
MCL002	UAH15CL153 USS15CL153	Physiology Lab	b	-	-	2	2	1
	UTC15CL153		b	-	-	1	1	1
<b>Offered to UG Program</b> of AUHS, AMIR, Sports & Exercise Sciences, Optometry and Trauma Care Management								

**Objectives of the course:**

**At the end of this course the students should be able to:**

- ✓ Comprehend basic terminologies used in the field of Human Physiology
- ✓ Define and describe basic Physiological Processes governing the normal functioning of the human body
- ✓ Apply this knowledge in their Allied Health Science practice

**Contents:**

**UNIT I**

**Ia. GENERAL PHYSIOLOGY**

Concept of Homeostasis - Cell structure and functions -Transport across membranes

**Ib. NERVE & MUSCLE**

Nerve structure, classification of nerve fibres, Muscles-classification, structure, Neuro-Muscular junction (NMJ), Muscle contraction – mechanism, types.

**Ic. BLOOD AND BODY FLUIDS**

Body fluid volumes, compartments, and composition - Blood composition and functions - Plasma proteins – Erythrocytes – Morphology and functions , Leucocytes – Morphology and functions, Platelets-Morphology and functions Blood groups.

**UNIT II**

**Iia. DIGESTIVE SYSTEM**

Salivary glands- Nerve supply, functions of saliva, Gastric juice- composition & functions of gastric juice. Pancreatic juice – composition, functions and regulation of Pancreatic juice, Bile – composition, functions of bile & bile salts. Succus entericus and small intestinal movements, Deglutition, vomiting, functions of large intestine

**Iib. SKIN**

Structure of sweat glands; temperature regulation

**Iic. EXCRETORY SYSTEM**

Structure of Nephron and its blood supply, Juxta Glomerular Apparatus (JGA)  
Formation of urine- Filtration, Reabsorption & Secretion, Counter-Current mechanism, Micturition

**UNIT III**

**IIia. ENDOCRINE SYSTEM**

Hypothalamo hypophyseal inter relationship - Anterior pituitary hormones and their functions - Posterior pituitary hormones and their actions - Thyroid hormones, biosynthesis and functions - Parathyroid hormones, functions  
Insulin, Glucagons, actions and Diabetes mellitus - Adrenal cortex hormones and their functions.  
Adrenal medullary hormones and their actions

**IIib. REPRODUCTION:**

Male reproductive organs - Spermatogenesis and Testosterone actions, Female reproductive organs - Menstrual cycle



#### **UNIT IV**

##### **IV . RESPIRATORY SYSTEM**

Structure of upper and lower respiratory tract. Muscles of respiration and Mechanism of respiration.

Lung volumes and capacities – definitions, normal values, intra pulmonary and intra pleural pressures, surfactant

Oxygen transport, Carbon-dioxide transport - Neural and chemical regulation of respiration - Hypoxia, cyanosis

#### **UNIT V**

##### **V CARDIOVASCULAR SYSTEM**

Cardiac muscle, action potential & Conducting system of the heart, Cardiac cycle, ECG, heart sounds

Cardiac output-Definition, factors regulating cardiac output and measurement of cardiac output.

Blood pressure – Definition, measurement, factors maintaining B.P, Regulation of B.P,

Regional circulation – Coronary and Cerebral

#### **UNIT VI**

##### **VI a. NERVOUS SYSTEM**

Structure & Properties of Neuron - Nerve – Classification, injury - Types and properties of Receptors

Synapse and synaptic transmission, Reflex and its properties , Spinal cord – Ascending & Descending tracts

Thalamus, Basal ganglia, Cerebellum, Cerebral cortex, Hypothalamus & Cerebrospinal fluid - Autonomic nervous system.

##### **VI b.SPECIAL SENSES**

Vision, Audition, Olfaction, Gustation

#### **Practical:**

1. Recording of Arterial Blood Pressure (BP)

#### **Practical Demonstration:**

1. Determination of RBC count
2. Determination of WBC count
3. Differential leucocyte count (DLC)
4. Determination of Hb, PCV & ESR.
5. Determination of Blood groups, Bleeding and Clotting time.
6. Charts & Instruments - Spotters

A practical observation note book of these experiments must be maintained by the student.

**Recommended Book**

- Basics of Medical Physiology (Third edition) by D. Venkatesh/ H.H. Sudhakar

**Reference books**

- Medical physiology for under graduates by Indhu Khurana,
- Text Book of Physiology by A.K. Jain for BDS

**Online references:**

[www.elsevier.com/medical/physiology](http://www.elsevier.com/medical/physiology)

**Biochemistry**

Offered by Department of Biochemistry								
Course Number	Course Code	Course Title	RG	L	T	P	C	Semester
MCT003	UAH15CT105 USS15CT105 UTC15CT105	Biochemistry	c	4	-	-	4	1
	UOP15CT107		-	4	-	-	4	1
	UPT15DE108		-	3	-	-	3	2
MCL003	UAH15CL155	Biochemistry Lab	c	-	-	2	2	1
	USS15CL155 UTC15CL155		c	-	-	1	1	1
<b>Offered to UG Program</b> of AUHS, AIMR, Sports & Exercise Sciences , Optometry and Trauma Care Management								

**Objectives :**

- To have a knowledge about the chemistry and metabolism of various macromolecules- carbohydrate, protein and lipids
- To learn about enzymes, vitamins, minerals and nutrition
- To know the structure and function of Hemoglobins, Nucleic acids.
- To learn about the organ function tests like Liver Function Tests and Renal Function Tests.

**Unit – I :**

**Carbohydrates** – Classification of carbohydrates and their biological importance, Reducing property of sugars.

**Metabolism of Carbohydrates** : Digestion and Absorption of carbohydrates, steps of Glycolysis and energetics, steps of TCA cycle

and energetics, steps of Glycogen synthesis and breakdown, significance of HMP shunt pathway, definition and steps of Gluconeogenesis, Galactose metabolism, Diabetes mellitus, Galactosemia.

**Bioenergetics** : Importance of ATP, outline of respiratory chain.

**Unit – II :**

**Lipids** – Classification of lipids, essential fatty acids, functions of cholesterol, triglycerides, phospholipids

**Metabolism of Lipids** : Digestion and Absorption of lipids, steps of  $\beta$  oxidation of fatty acids, types and functions of lipoprotein,

Lipid profile, hypercholesterolemia

**Haemoglobin** : Structure and functions of Haemoglobin.

**Unit – III :**

**Proteins** – Classification of amino acids, structure of proteins, plasma proteins, immunoglobulins.

**Metabolism of Proteins** : Digestion and absorption of proteins, transamination, deamination, steps of urea cycle, Phenylketonuria,

Alkaptonuria, Transmethylation, products derived from Glycine and tyrosine

**Nucleic acids** : Structure and function of DNA & RNA, Types of RNA

**Unit – IV :**

**Enzymes** : Definition, classification, coenzymes, factors affecting enzyme activity, Types and examples of enzyme inhibition.

**Function Tests**: Liver function tests, Renal function tests

**Vitamins** : Classification, Fat soluble vitamins: Functions, source, deficiency manifestations of vitamin A, D E and K, Functions and

deficiency manifestations of vitamin C, co-enzymic forms and deficiency manifestations of B-complex vitamins.

**Unit – V :**

**Nutrition** : Basal metabolic rate (BMR), Specific Dynamic Action (SDA), Glycemic index, Dietary fiber, Balanced diet, Protein Energy

Malnutrition (PEM).

**Minerals** : Calcium, Phosphorus, Iron, iodine.

Outline of PH homeostasis

**Text books Recommended :**

1. Textbook of Biochemistry for Paramedical Students By Dr.P.Ramamoorthy
2. Essentials of Biochemistry by U. Sathyanarayana

**Reference books :**

1. Text book of Biochemistry for Medical students by DM vasudevan, Sreekumari S, Kannan Vaidyanathan. 7<sup>th</sup> Edition
2. Harper's Illustrated Biochemistry – 30<sup>th</sup> Edition.

**Practical:**

1. Demonstration of reactions of carbohydrates and proteins.
2. Interpretation of charts

**PRACTICAL EXAM SCHEME**

Spotters	Charts	Total
2 x 10 spotters = 20 marks	5 x 6 charts = 30 marks	50 marks

**Pathology**

Offered by Department of Pathology								
Course Number	Course Code	Course Title	RG	L	T	P	C	Semester
MCT004	UAH15CT104 USS15CT104	Pathology	e	3	-	-	3	2
	UOP15CT104 UTC15DE110		-	3	-	-	3	2
MCL004	UAH15CL154 USS15CL154	Pathology Lab	e	-	-	1	1	2
<b>Offered to: UG Program</b> of AUAH, AIMR, Sports & Exercise Sciences , Optometry and Trauma Care Management								

**Learning Objectives**

This module aims at providing an understanding of basic concepts of pathology including process of inflammation and features of various systemic diseases.

**Contents****Unit I: Introduction**

Concept of diseases, classification of lesions - Inflammation and repair - Cellular adaption, Cell injury, necrosis and gangrene

Haemodynamic disorders including hemorrhage, shock, embolism and thrombosis.

**Unit II: Infections**

Tuberculosis - Leprosy and Typhoid.

**Unit III: Deficiency diseases**

Anaemias

**Unit IV: Tumour Pathology**

Tumors – Terminologies, Nomenclature. Differences between benign and malignant tumors

Tumors – Etiology, pathogenesis and spread of tumors.

**Unit V: Systemic Disorders**

**Heart:** Coronary Heart Disease (Ischemic Heart Disease) including atherosclerosis Congenital and Valvular Heart Diseases

**Respiratory System-** Bronchial Asthma, Emphysema, Bronchiectasis

**Bone and Joints** – Autoimmune diseases, septic arthritis, osteomyelitis , rheumatoid arthritis

**Diseases of the Kidney -** Diseases of other parts of the Urinary System

**Central Nervous System** CNS infections

**Muscle -** Diseases of muscle including poliomyelitis, myopathies

**Gastrointestinal System** Diseases of Esophagus, Stomach and Intestine , Diseases of Liver and Pancreas.

**Reproductive system-**Diseases of uterus, cervix, ovaries and testis.

**Learning Outcomes:**

At the end of the module, the student must be able to

1. Describe the features of inflammation and cellular adaption, cell injury
2. Identify and describe the features of hamodynamic disorders and deficiency diseases
3. Understand and describe the pathogenesis and pathology of various systemic disorders

**Recommended Textbook:**

Textbook of Pathology ,Harsh Mohan,3<sup>rd</sup> edition

**Reference book:**

Robbins Basic Pathology- 3<sup>rd</sup> edition

**Pathology Lab:**

**Learning Objective**

The Gross specimens and instruments relevant to the disease processes and diseases taught will be shown and explained.

**Unit I: Gross Specimens**

1. Gangrene Bowel
2. Tuberculosis of Lung
3. Lipoma
4. Squamous cell Carcinoma of Foot
5. Infective Endocarditis
6. Left Ventricular Hypertrophy
7. Osteoclastoma
8. Osteogenic Sarcoma
9. Osteomyelitis
10. Chronic Pyelonephritis-Kidney

**Unit II: Haematology Instruments:**

1. Sahli's Haemoglobinometer
2. Sahli's pipette
3. Westergren's tube
4. Wintrobe's tube
5. Neubauer's Chamber
6. RBC pipette
7. WBC pipette

**Recommended reading**

Harsh Mohan- Practical Pathology

### Pharmacology

Offered by Department of Pharmacology								
Course Number	Course Code	Course Title	RG	L	T	P	C	Semester
MCT005	UAH15CT106 UTC15CT102	Pharmacology	f	3	-	-	3	2
	UOP15CT212		f	3	-	-	3	4
MCL005	UAH15CL156 UTC15CL152	Pharmacology Lab	f	-	-	1	1	2
Offered to UG Program of AUHS, Optometry and Trauma Care Management								

#### Course Objectives:

1. To understand the terminologies and basic principles of pharmacokinetic and pharmacodynamic involved in the use of drugs.
2. To understand the pharmacological action and mechanism of action of common drugs used for different disease conditions.
3. To know the therapeutic uses and adverse effects of common drugs used for different disease conditions

#### 1. Introduction

General pharmacological principles-Definition-Routes of drug administration-Pharmacokinetics-Pharmacodynamics-Adverse drug effects

#### 2. Drugs acting on Autonomic Nervous System, Peripheral Nervous System and Drugs acting on Central Nervous system

General considerations-Cholinergic system & drugs-Anticholinergic drugs-Adrenergic drugs-antiadrenergic drugs-Drugs acting on autonomic ganglia. Skeletal muscle relaxants-Local anaesthetics,General anaesthetics-Ethyl & Methyl alcohol-Sedatives-Hypnotics-Antiepileptics-Antiparkinsonian drugs-Drugs used in mental illness-Opioid analgesics and Non opioid Analgesics-Nonsteroidal Antiinflammatory drugs

## 2. Cardiovascular drugs , Drugs affecting Blood & Blood formation and Drugs on Respiratory system

Cardiac glycosides, Antiarrhythmic drugs, Antianginal drugs, Antihypertensives and Diuretics, Haematinics, Erythropoietin, Drugs affecting coagulation, Fibrinolytic and Antiplatelet drugs, Treatment of cough and antiasthmatic drugs

## 4. Antimicrobial drugs

General consideration-Antibiotics-Antibacterial agents-Antitubercular drugs-Antifungal-Antileprotic-Antiviral-Antimalarial-Antiamoebic-Antiprotozoal drugs-Cancer Chemotherapy, Antiseptic-Disinfectant-others.

## 5. Hormones & related Drugs, Drugs used in Gastrointestinal diseases & Miscellaneous drugs

Corticosteroids, Antithyroid drugs and Drugs for Diabetes Mellitus, Treatment of Vomiting, Constipation, Diarrhoea and Treatment of peptic ulcer Vitamins, Vaccines, Sera and chelating agents.

### Recommended books:

- i. Prep Manual for Undergraduates in Pharmacology by Tara V Shanbag, 2<sup>nd</sup> edition
- ii. Pharmacology for Dental and Allied Health Sciences by Padmaja Udaykumar, 3<sup>rd</sup> edition

### Reference books:

- i. Essentials of Medical Pharmacology by KD Tripathi, 7<sup>th</sup> edition
- ii. Basic and Clinical Pharmacology by Bertram G Katzung, 12<sup>th</sup> edition

### Online reference:

- i. RxMED <http://www.rxmed.com/>
- ii. RxList <http://www.rxlist.com/>

## Pharmacology Lab

### Learning Objective

This module is intended to discuss the various modalities of drug delivery and instruments relevant to it.

#### Instruments:

##### Needles

Intravenous, Intrathecal , Spinal, Intra arterial

##### Students Discussion

Syringes: Tuberculin, Insulin, I.V cannula, Scalp. Vein set

##### Students Discussion

Enema can, Inhalers, Spacers, Nebulizers

##### Students Discussion

Tablets – Enteric coated, Sustained release, Sub-lingual

##### Students Discussion

Capsules, Spansules, Pessary, Suppository

##### Students Discussion

Topical Preparation, Ointment, Lotion, Powder, Drops – eye / ear

**Charts:** Mechanism of action of drugs, adverse effects, toxicology



Spotters: drugs

**Text books suggested for reading:**

1. Text book of pharmacology for Dental & Allied Health Science 2nd edition Padmaja Udaykumar
2. Pharmacology for dental students Tara V Shanbhag, Smita Shenoy, Veena Nayak
3. Principles of pharmacology 2nd edition H.L.Sharma & KK Sharma

**Microbiology**

Offered by Department of Microbiology								
Course Number	Course Code	Course Title	RG	L	T	P	C	Semester
MCT006	UAH15CT102	Microbiology	d	3	-	-	3	2
	UOP15CT102		-	3	-	-	3	2
MCL006	UAH15CL152	Microbiology Lab	d	-	-	1	1	2
Offered to UG Program of AUHS and Optometry								

**Objective:**

At the end of the semester the students should be able to

1. Know the concepts of sterilization and disinfection procedures and their applications.
2. Understand the basic principles of immunology.
3. Understand the basic fundamental aspects of bacteria, virus, fungus and parasites, and study the common disease caused by them.

**Contents:**

**Unit I** History and introduction to microbiology, study the morphology of bacterial cell and their functions.

**Unit II** Basic concepts about infection, (Source, portal of entry & spread) immunity, biomedical waste management and standard precautions

**Unit III** Sterilization and disinfection procedures and their application.

**Unit IV** Common bacterial, viral, fungal and parasitic pathogens and the diseases caused by them with preventive and treatment measures.

**Unit V** Applied microbiology- Sexually transmitted diseases, hospital acquired infections, urinary tract infections, skin and soft tissue infections and anaerobic infections.

#### **Recommended books**

- a. Prof C P Baveja - Text book of Microbiology.
- b. Satish Gupte- Text Book of Microbiology

#### **Reference books**

- a. Ananthanarayanan & Paniker's, Text Book of Microbiology.
- b. Mackie & McCartney Practical medical Microbiology

#### **Online References:**

- a. [www.microrao.com](http://www.microrao.com)
- b. [www.slideshare.net](http://www.slideshare.net)

#### **Microbiology Lab:**

#### **Learning Objective**

This module aims at providing practical knowledge in the recognition of common pathogenic organisms ,infectious diseases and their lab diagnosis.

1. **Spotters**
  - a) Disposable syringe
  - b) Sterile cotton swab
  - c) Bacterial filters
  - d) Anaerobic jars
  - e) Gram stained smears showing gram positive cocci and gram negative bacilli
  - f) Gram stained smears showing Candida

- g) Culture growth of Aspergillus and dermatophytes
- h) Bacterial culture media plates (Blood agar, chocolate agar and MacConkey's agar)
- i) Antibiotic susceptibility test
- j) Ascaris lumbricoides
- k) Taenia

## 2. Clinical case discussion with charts

- a) Skin and soft tissue infections
- b) Clostridial infections
- c) Ring worm/ Tinea infections
- d) Food poisoning
- e) Gastroenteritis

### Learning outcomes:

At the end of the module, the student must be able to have brief practical knowledge on infectious disorders.

### Recommended reading

Practical Microbiology - Prof. C.P.Baveja

### Basics of Medical Sciences

Offered by Management College								
Course Number	Course Code	Course Title	RG	L	T	P	C	Semester
MCT007	UHS15CT107 UNT15CT101	Basics of Medical Sciences	-	4	-	-	4	1
Offered to UG Program of GUHS and AUNT								

### Objectives:

1. To familiarize students on human body systems
2. To understand communicable and non communicable diseases

## **Section –A**

Basics of Medical Sciences

### **UNIT – I** (12 hours)

**ORGANIZATION OF THE HUMAN BODY:** Introduction to the Human Body – Anatomical Position – Terminologies related to Anatomy – Levels of Organization of the body.

Structure of different systems of human body –Musculoskeletal system, Endocrine system, Nervous system, Cardio-vascular system, Digestive system, Excretory system, Respiratory system and Reproductive system

### **UNIT – II** (18 hours)

#### **HUMAN BODY SYSTEMS**

Physiology of different systems of human body:— Musculoskeletal system, Endocrine Systems, Nervous Systems, Cardiovascular System, Respiratory System ,Digestive System, Reproductive System, and Excretory System

## **Section –B**

### **UNIT – III** (30 hours)

**CONCEPTS OF HEALTH:** Concepts of Health - Definition and Dimensions of Health, Spectrum of Health, Determinants of Health, Indicators of Health.

### **Unit IV**

**CONCEPTS OF DISEASES :** Concept of disease, Concept of disease causation, Natural history of disease, Concept of disease control, Levels of prevention, Modes of disease intervention, Internal Classification of disease.

### **UNIT – V**

#### **COMMUNICABLE AND NON-COMMUNICABLE DISEASES**

Communicable and Non-communicable disease burden, Community Acquired Infections, Nosocomial Infections.

### **Unit VI**

Common Non Communicable Diseases – Coronary Heart Disease, Hypertension, Diabetes, Cancer.

### **UNIT – VII**

#### **DEMOGRAPHY, ENVIRONMENT AND HEALTH**

Demographic Cycle, Demographic trend in India, National population policy 2000, National Family Planning Programme. Environment and health, Pollution , Nature, Sources, Health effects and management.

### **Text Books:**

Anatomy & Physiology: Ross & Wilson Anatomy & Physiology in Health & Illness – 12<sup>th</sup> Edition  
 Community medicine : Essentials of Community Health Nursing – J.E.Park&K.Park

### Reference Books

1. Park's Textbook of Preventive & Social Medicine – K.Park
2. Handbook of Anatomy for Nurses – Latest edition – P.Saraswathi – Jaypee Brothers
3. Essentials of Medical Physiology – K.Sembulingam&PremaSembulingam

### Basics of Research Methodology and Biostatistics

Offered by Department of Community Medicine/ EHE/ Bioinformatics								
Course Number	Course Code	Course Title	RG	L	T	P	C	Semester
MCT008	UOP15CT208	Basics of Research Methodology & Biostatistics	-	4	-	-	4	4
	UNT15CT301		-	4	-	-	4	5
	UPT15CT407		-	4	-	-	4	7
Offered to UG Program of AUOP, TUPT and AUNT								

### Learning Objectives:

### Learning Outcomes:

#### UNIT I:

Introduction to the Process of Conducting Research: Introduction, Steps in the Process of Research, Identifying a hypothesis and/or research problem, specifying a purpose, Research Designs, Creating research questions, Review of literature, Ethics of research and informed consent, Research proposal writing & components of Research paper.

#### UNIT II:

Introduction to Qualitative, Quantitative and Mixed methods Research: Essence of Qualitative Data, Sampling, Collection Techniques, Biography, Essence of Quantitative Data, Collection and Analysis Techniques, Choosing a good instrument, Interval and Ratio Scales, Validity and Reliability, Essence of Mixed Methods, Advantages, Design Components, Explanatory Mixed Methods Frameworks.

#### UNIT III:

Epidemiological Methods: Measuring disease frequency, Descriptive and analytical studies-observational and experimental studies and Biases in Epidemiological Studies.

**UNIT IV:**

Introduction to Probability, distributions and sampling: Probability, addition and multiplicative theorems, problems, Probability distribution-Binomial, Poisson, Normal, Applications to health sciences, Sampling methods, uses of sampling, Sample size.

**UNIT V:**

Introduction to Descriptive Statistics: Introduction, Summarizing and describing a collection of data, Univariate and bivariate analysis, Mean, mode and standard deviation, Percentages and Ratios, Histograms, Identifying randomness and uncertainty in data, Summarizing biological data, Identifying the dependent and independent variables, Confidence levels

**UNIT VI:**

Introduction to Inferential Statistics: Drawing inference from data, Estimation, Testing of hypothesis, Type I&type II errors, power and p-value, Modeling assumptions, Identifying Patterns, Regression analysis, t-test, Analysis of Variance, Correlations, Chi-square, Non-parametric tests.

**Text Books:**

**Biostatistics:**

- Introduction to Biostatistics and Research Methods by Sunder Rao PSS Y Richard J . PHI publishers 2012.
- Biostatistics: A Foundation for Analysis of Health Sciences by Danial WW. John Wiley Publishers.
- Primer of Biostatistics by Galantz SA. McGraw Hill Press, 2011
- Essentials of Medical Statistics by Kirkwood BR and Sterne JAC. Blackwell Publishers
- Fundamentals of Biostatistics by Rosner B & Rosner R. Cergage Learning Inc. 2010.

**Research Methodology:**

- Research Methods: Methods and Techniques by Kothari CR. New Age International Publishers- 2004
- Research Methodology: A step by Step Guide to Beginners by Ranjit Kumar. SAGE Publishers-2014.
- Research Methods by Pannerselvam R. PHI Learning Pvt Ltd-2013
- Becoming Quantitative Researchers- An Introduction by Glesne C. Pearson Publishers-2015
- Research Methods by Rajendra Kumar. APH Publishers-2008

## Introduction to Basic Medical Science

Offered by Department of Community Medicine								
Course Number	Course Code	Course Title	RG	L	T	P	C	Semester
MCT009	PHM15CT113 PBI15CT101	Introduction to Basic Medical Science	-	4	-	-	4	1
Offered to PG Program of GPHM and BPBI								

**Objectives:**

- To familiarize students on human body systems
- To understand communicable and non communicable diseases

**UNIT – I ( 12 hours)**

**ORGANIZATION OF THE HUMAN BODY:** Introduction to the Human Body – Anatomical Position – Terminologies related to Anatomy – Levels of Organization of the body. Structure of different systems of human body –Musculoskeletal system, Endocrine system, Nervous system, Cardio-vascular system, Digestive system, Excretory system, Respiratory system and Reproductive system

**UNIT – II ( 18 hours)****HUMAN BODY SYSTEMS**

Physiology of different systems of human body:— Musculoskeletal system, Endocrine Systems, Nervous Systems, Cardiovascular System, Respiratory System ,Digestive System, Reproductive System, and Excretory System

**UNIT – III ( 30 hours)**

**CONCEPTS OF HEALTH AND DISEASES** : Concepts of Health - Definition and Dimensions of Health, Spectrum of Health, Determinants of Health, Indicators of Health, Concept of disease, Concept of disease causation, Natural history of disease, Concept of disease control, Levels of prevention, Modes of disease intervention, Internal Classification of disease.

**UNIT – IV**

**PRINCIPLES OF EPIDEMIOLOGY AND EPIDEMIOLOGICAL METHODS:** Definition and basic concepts of Epidemiology including epidemiological triad, Basic measurement in Epidemiology including measures of mortality and morbidity, Methods in Epidemiology, Infectious disease epidemiology, Investigation of an epidemic out break.

**UNIT – V****COMMUNICABLE AND NON-COMMUNICABLE DISEASES**

Communicable and Non-communicable disease burden, Community Acquired Infections, Nosocomial Infections, Common communicable diseases: Polio, Tuberculosis, Viral Hepatitis, HIV/AIDS. Common Non Communicable Diseases – Coronary Heart Disease, Hypertension, Diabetes, Cancer.

**UNIT – VI****DEMOGRAPHY, ENVIRONMENT AND HEALTH**

Demographic Cycle, Demographic trend in India, National population policy 2000, National Family Planning Programme. Environment and health, Pollution , Nature, Sources, Health effects and management.

**Text Books:**

Anatomy & Physiology: Ross & Wilson Anatomy & Physiology in Health & Illness – 12<sup>th</sup> Edition  
Community medicine : Essentials of Community Health Nursing – J.E.Park&K.Park

**References :**

1. Instant Anatomy - Robert H. Whitaker, Neil R. Borley.
2. Epidemiology in Health Services Management, (1984) - G.E.Alan Dever, Asper publication. In Gaithersburg, Maryland

**Research Methodology& Biostatistics**

Offered by Department of Community Medicine/ EHE/ Bioinformatics								
Course Number	Course Code	Course Title	RG	L	T	P	C	Semester
MCT010	IMR15CT308	Research Methodology & Biostatistics	-	4	-	-	4	6
	PCN15CT104 PMI15CT108 PML15CT108 PNS15CT108 PRS15CT110		-	4	-	-	4	2
	PMT15CT103 PMT15CT103 PMT15CT103 PMT15CT103		-	4	-	-	4	1



**Offered to PG Program** of AIMR, APCN, APMI, APML, APNS, APRS, TPCS, TPNU, TPOT, TPOG

**Learning Objectives:**

**Learning Outcomes:**

**UNIT I:**

**Introduction to Research:** The hallmarks of scientific research – Building blocks of science in research – Concept of Applied and Basic research – Quantitative and Qualitative Research Techniques – Need for theoretical frame work – Hypothesis development for Quantitative and Quantitative Data, Research Design – Purpose of the study: Exploratory, Descriptive, Research Ethics, Report Writing.

**UNIT II:**

**Data Collection Methods:** Interviewing, Questionnaires, etc. Secondary sources of data collection, Guidelines for Questionnaire Design – Electronic Questionnaire Design and Surveys. Static and Dynamic panels. Measurement of variables – Scales and measurements, Developing scales – Rating scale and attitudinal scales – Validity testing of scales – Reliability concept being developed in scales, Sampling Techniques – Probabilistic and non-probabilistic samples. Issues of Precision and Confidence in determining Sample Size, Optimal sample size. Statistical Softwares,

**UNIT III:**

**Epidemiological Methods:** Definition and scope, Health and Disease, Measures used in Epidemiology, Epidemiological Study Designs, Biases, Uses of Epidemiology, Surveillance

**UNIT IV:**

**Laboratory Experimental Designs:** Basic laboratory Designs– Completely Randomized Design, Randomized Block Designs, Latin Square Design, Incomplete Block Designs, Crossover and Factorial Designs (only applications).

**UNIT V:**

**Biostatistical Concepts:** Role of Biostatistics in Research, Descriptive Statistics, Random Variable, Expected Value and Variance, Probability Distributions-Discrete and Continuous, Correlation and Regression, Partial and Multiple Correlations, Multiple Linear Regression, Logistic Regression, Poisson Regression (only applications)

**UNIT VI:**

**Statistical Inference:** Estimation and testing of hypothesis, Types of errors, Power, p-value, Confidence Interval, t-test, Z test, ANOVA, Chi-square and other Nonparametric tests, Multivariate methods-Factor Analysis, Principal Component and Partial Least Square, Cluster Analysis – Discriminant Analysis, Canonical correlations (only application).

**Text Books:**

**Research Methodology**

1. McBurney, DH: Research Methods, Thomson Asia Pvt. Ltd. Singapore, 2002.
2. Cooper DR and Schindler RS: Research Methods, Tata McGraw- Hill Publishing Company Limited, 2000
3. Ticehurst GW and Veal AJ: Business Research Methods, Longman, 1999.
4. Kothari CR: Research Methods: Methods and Techniques New Age International Publishers- 2004
5. Ranjit Kumar Research Methodology: A step by Step Guide to Beginners. SAGE Publishers-2014.
6. Pannerselvam R : Research Methods by. PHI Learning Pvt Ltd-2013.

**Biostatistics**

1. Danial WW, Biostatistics: A Foundation for Analysis of Health Sciences, John Wiley Publishers-2009
2. Kirkwood BR and Sterne JAC: Essentials of Medical Statistics , Blackwell Publishers,2003
3. Rosner B & Rosner R: Fundamentals of Biostatistics by. Cergage Learning Inc. 2010
4. Flick U. Introducing Research Methodology- A Beginners Guide to Doing a Project Sage Publishers, 2011.
5. Glantz SA: Primer of Biostatistics, McGraw Hill Publishers, 2011
6. Indrayan A: Medical Biostatistics, Chapman and Hall/CRC, 2012
7. Baldi B and Moore DS: The Practice of Statistics in Life Sciences, W.H. Freeman Publishers, 2014