Schedule III (Course Work Amended)

Valuation scheme of coursework for PH.D. Programme at STU Udaipur

In compliance with UGC (Minimum Standards and Procedures for Award of M. Phil/ Ph.D. Degree) Regulations, 2022 Effective from 07-03-2025(revised)

Paper	Paper code	Subject	Credits	Min. Qualifying Marks	Max. Marks
1	Compulsory modules I	Research Methodology & Computer Application	4	50	100
2	Compulsory modules II	Research & Publication Ethics *	2	25	50
3	Compulsory modules III	Seminar and Literature Review (Internal Assessment= (Presentation + Report)	2	25	50
4	Core Module	Discipline Specific **	4	50	100

*As per UGC D.O. No. F-1-1/2018 (Journal/CARE), December 2019.

** The student shall select the one core module from the courses offered by department where he/she is registered in Ph.D. program.

Format for Written Course work Examination:

Total Marks: 100

Section	Type of Question	Marks	Number of questions	Marking scheme
A	Objective /MCQ	30	15 questions	15 X 2 = 30
B	Short Answer	25	5 question out of 7	5 X 5 = 25
C	long Answer / Descriptive / Analytical	45	3 Questions out of 5	3 X 15 = 45

Total Marks: 50

Section	Type of Question	Marks	Number of questions	Marking scheme
A	Objective /MCQ	20	10 questions	10 X 2 = 20
B	Short Answer	20	4 question out of 5	4 X 5 = 20
C	long Answer / Descriptive / Analytical	10	1 Questions out of 3	1 X 10 = 10

Classification of Result:

Following grading system with 10-point scale shall be followed to represent performance of students in the examination

Grading System

% of marks	85-100	75-84	65-74	55-64	50-54	<50
Grade	A+	A	B	C	D	F
Grade Value	10	9	8	7	6	0

PhD COURSE WORK MODULES, STU Udaipur

COMPULSORY MODULES TOTAL 120 Hrs

Paper code	Paper	Credits	Durations
STURM01	Research Methodology & Computer Application	04	60 hrs
STURPE02	Research & Publication Ethics	02	30 hrs
STUSLR03	Seminar and Literature Review (Internal Assessment= (Presentation + Report)	02	30 hrs

CORE MODULES (4 CREDITS) Total 60 hrs

Discipline Specific Course Work (Elective) Each 4 credits

The student shall select the one core module from the courses offered by Department where he/she is registered in Ph.D. program

Paper code	Paper	Credits	Durations
STUAN04	Anatomy	04	60 HRS
STUBCH04	Biochemistry		
STUMANG04	Management Studies		
STUMICR04	Microbiology		
STUNUR04	Nursing		
STUCOLY04	Pharmacology		
STUPHY04	Physiology		
STUPHT04	Physiotherapy		

SYLLABUS
Ph.D. COURSE WORK
Paper-I Research Methodology & Computer Application

Marks: 100 Credits: 04
Duration: 60 Hrs Paper code: STURM01

Course Objectives:

- to enable the scholars, understand the concepts of research methods.
- to design the Research Proposal and decide the sample techniques and size.
- to understand the mode of collecting data and do the interpretation of the same.
- to expose the scholars to statistical tools and packages, imperative for researches.
- to learn the art of writing the reports and to be cautious of plagiarism.

Course Outcomes:

- Scholars would have understood the concepts of research methods.
- Scholars would have learnt to design the Research Proposal and decide the sample techniques and size.
- Scholars would have become familiar with the mode of collecting data and do the interpretation of the same.
- Scholars would have been exposed to the statistical tools and packages, imperative for researches
- Scholars would have learnt the art of writing the reports and to be cautious of plagiarism.

Course Content:

Unit 1 -Introduction to Research Methodology

- Meaning and importance of Research- Characteristics and objectives of research – Types of Research – Selection and formulation of Research Problem
- A brief introduction to research in Indian Knowledge tradition.
- Hypothesis – Different Types – Significance – Development of Working Hypothesis, Null hypothesis

Unit 2- Data Collection and Analysis

- Sources of Data, Types of Data, Methods of Collecting Data & Sampling Methods.

Unit 3- Report Writing

- Structure and components of Scientific Reports – types of Report – Technical Reports and Thesis – Significance – Different steps in the preparation – Layout, structure and Language of typical reports - Illustrations and tables – Bibliography, Referencing and foot notes.

- Preparing Research papers for journals, Seminars and Conferences – Design of paper using TEMPLATE, Calculations of Impact factor of a journal, citation Index, ISBN & ISSN.
- Preparation of Project Proposal - Title, Abstract, Introduction – Rationale, Objectives, Methodology – Time frame and work plan – Budget and Justification – References

Unit 4- Basic Computer Applications

- Operation of computer, Introduction and Application: MS Word, MS Excel, Power Point, Publisher, Use of computer and internet in research.

Suggested Readings: -

1. Garg BL, Karadia R, Agarwal F, Agarwal UK. *An introduction to research methodology*. Jaipur: RBSA Publishers; 2002.
2. Kothari CR. *Research methodology: Methods and techniques*. 2nd ed. New Delhi: New Age International Publishers; 2008.
3. Sinha SC, Dhiman AK. *Research methodology*. Vol. 1–2. New Delhi: Ess Ess Publications; 2002.
4. Gupta SP. *Statistical methods*. 37th rev ed. New Delhi: Sultan Chand and Sons; 2008. 1470 p.
5. Leon A, Leon M. *Internet for everyone*. New Delhi: Vikas Publishing House; 2002.
6. Oakman RL. *Computer methods for literary research*. Athens (GA): University of Georgia Press; 1984.
7. Wadehra BL. *Law relating to patents, trademarks, copyright, designs and geographical indications*. New Delhi: Universal Law Publishing; 2000.
8. Bulakh PM, Patki PS, Chodhary AS. *Research methodology*. Mumbai: Expert Trading Corporation; 2010.

SYLLABUS
Ph.D. COURSE WORK
Paper-II **Research and Publications Ethics**

Marks: 50 Credits: 02
Duration: 30 hrs Paper code: STURPE02

Course Objectives

1. Introduce the principles of ethics and their relevance in research and publication.
2. Educate scholars about common forms of research and publication misconduct.
3. Familiarize students with ethical guidelines, publication standards, and tools for academic integrity.
4. Promote responsible authorship, peer review, and journal selection practices.

Course Outcomes

1. Identify and avoid unethical research and publication practices.
2. Apply ethical guidelines in writing, submitting, and reviewing scholarly work.
3. Use tools and databases to select credible journals and assess research impact.
4. Demonstrate awareness of predatory journals and plagiarism detection mechanisms.

Course Content:

Unit 1: Philosophy and Ethics

- Introduction to philosophy: definition, nature, and scope, concept, branches
- Ethics: definition, moral philosophy, nature of moral judgment and reactions

Unit 2: Scientific Conduct

- Ethics with respect to science and research
- Intellectual honesty and research integrity
- Scientific misconducts: falsification, fabrication, and plagiarism (FFP)
- Redundant publications: duplicate and overlapping publications, salami slicing
- Selective reporting and misrepresentation of data

Unit 3: Publication Ethics

- Publication ethics: definition, introduction, and importance
- Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
- Conflicts of interest
- Publication misconduct: Definition, concept, problems that lead to unethical behavior and vice-versa type
- Violation of publication ethics, authorship and contributor-ship
- Identification of publication misconduct, complaints and appeals
- Predatory publishers and journals

Unit 4: Open Access Publishing

- Open access publications and initiatives
- SHERPA/RoMEO online resource to check publisher copyright and self-archiving policies
- Software tool to identify predatory publications developed by UGC

- Journal finder/journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.

Unit 5: Publication Misconduct

- Group discussions and case studies

    - Subject specific ethical issues, FFP, authorship
    - Conflicts of interest
    - Complaints and appeals: examples and fraud from published papers

Unit 6: Databases and Research Metrics

- Databases: Indexing databases
- Citation databases: Web of Science, Scopus, etc.

- Research Metrics:

    - Impact Factor of journal as per Journal Citation Report (JCR),SNIP, SJR, IPP, Cite Score
    - h-index, g-index, i10 index

Suggested Readings:

1. Bird A. *Philosophy of science*. London: Routledge; 2006.
2. MacIntyre A. *A short history of ethics*. London: Routledge & Kegan Paul; 1967.
3. Chaddah P. *Ethics in competitive research: Do not get scooped; do not get plagiarized*. New Delhi: Indian Academy of Sciences; 2018. ISBN: 978-9387480865.
4. National Academy of Sciences, National Academy of Engineering, Institute of Medicine. *On being a scientist: A guide to responsible conduct in research*. 3rd ed. Washington, DC: National Academies Press; 2009.
5. Resnik DB. What is ethics in research and why is it important? National Institute of Environmental Health Sciences; 2011. Available from: https://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm
6. Beall J. Predatory publishers are corrupting open access. *Nature*. 2012;489(7415):179. https://doi.org/10.1038/489179a
7. Indian National Science Academy (INSA). *Ethics in science education, research and governance*. New Delhi: INSA; 2019. ISBN: 978-81-939482-1-7. Available from: http://www.insaindia.res.in/pdf/Ethics%20Book.pdf.

SYLLABUS
Ph.D. COURSE WORK
Paper-III Seminar and Literature Review

Marks: 50 Credits: 02
Duration: 30 Hrs STUSLR03

Evaluation: Internal Assessment: (Presentation + Report)

Course Objectives:

- Equip researchers with skills to search, read, and evaluate relevant academic literature.
- Train scholars in organizing and synthesizing literature into coherent reviews.
- Enhance oral communication through seminar presentations.
- Support the development of the literature review chapter for the thesis.

Course Outcomes:

- Identify and review key academic literature related to their research area.
- Prepare a structured, critical literature review identifying research gaps.
- Present findings effectively through oral academic seminars.
- Engage in academic discussions and respond to feedback.

Course Content:

Unit 1: Literature Search and Review Planning

- Types of literature (primary, secondary, tertiary)
- Framing review questions and themes
- Identifying keywords and search strategies
- Using academic databases and libraries (Scopus, JSTOR, etc.)

Unit 2: Analytical Reading and Note-Making

- Active and critical reading techniques
- Summarizing and paraphrasing scholarly work
- Annotating and categorizing literature
- Identifying patterns, debates, and research gaps

Unit 3: Structuring the Literature Review

- Narrative, chronological, and thematic structures
- Synthesizing sources
- Connecting literature with research objectives
- Drafting review outlines

Unit 4: Referencing and Bibliography Management

- Using citation styles (APA, MLA, Chicago, etc.)
- Managing references with tools (Zotero, Mendeley, EndNote)

- Avoiding unintentional plagiarism

Unit 5: Seminar Presentation Skills

- Preparing seminar content and visual aids (PPT, handouts)
- Public speaking techniques for academic audiences
- Handling questions, feedback, and peer discussions
- Self-evaluation and improvement

Assessment Method (Internal):

Component	Weightage
Seminar Presentation (Topic-based)	40%
Written Literature Review Report	40%
Participation and Engagement	20%

Suggested Readings:

- • Hart, C. (1998). Doing a Literature Review: Releasing the Social Science Research Imagination. SAGE.
- • Ridley, D. (2012). The Literature Review: A Step-by-Step Guide for Students. SAGE.
- • Galvan, J. L. (2014). Writing Literature Reviews. Routledge.
- • UGC Guidelines on Research and Publication Ethics.
- Booth, A., Sutton, A., & Papaioannou, D. (2016). *Systematic Approaches to a Successful Literature Review*. SAGE.

SYLLABUS
Ph.D. COURSE WORK
CORE / ELECTIVE Module 1: ANATOMY

Marks: 100 Credits: 04
Duration: 60 hrs Paper code: STUAN04

Course Objectives:

1. Understand the structural and functional organization of the human body through gross, microscopic, and developmental anatomy.
2. Learn the anatomical basis of common clinical procedures and diagnostic imaging.
3. Grasp the fundamentals of human genetics and embryology relevant to health and disease.

Course Outcomes:

1. Identify and describe major anatomical structures and correlate them with their functions.
2. Apply anatomical and developmental knowledge in clinical contexts and problem-solving.
3. Explain genetic principles and developmental processes, including congenital anomalies.

Course Content:

Unit 1: General Anatomy & Limbs

- **General Concepts:** Bones, joints, muscles, connective tissue, cardiovascular, lymphatic, nervous system, skin & fascia.
- **Upper Limb (Supex):** Mammary gland, axilla, brachial plexus, shoulder, elbow, wrist, cubital fossa, radiocarpal joint, fascial spaces.
- **Lower Limb (Infex):** Femoral triangle, adductor canal, gluteal region, popliteal fossa, arches of foot, hip, knee, and ankle joints.

Unit 2: Thorax, Abdomen & Pelvis

- **Thorax:** Pleura, lungs, heart, pericardium, mediastinum, azygos system.
- **Abdomen & Pelvis:** Inguinal canal, peritoneum, GI tract (stomach to rectum), liver, spleen, pancreas, kidneys, ureters, urinary bladder, urethra, male & female genital organs, suprarenal glands, diaphragm, perineum, ischiorectal fossa.

Unit 3: Head, Neck & Face

- Scalp, neck, cranial cavity, dural sinuses, orbit, parotid & infratemporal regions, muscles of mastication, TMJ, facial nerve, submandibular & thyroid glands, tongue, pharynx, palate, tonsils, larynx, paranasal sinuses, eyeball, cranial nerves.

Unit 4: Neuroanatomy

- Meninges, CSF, spinal cord, brainstem, cerebrum, cerebellum, basal nuclei, thalamus, hypothalamus, limbic system, ventricles, blood supply of brain, reticular formation, autonomic nervous system.

Unit 5: Histology, Embryology & Genetics

- **Histology:** Tissues, glands, skin, organs of GI, respiratory, urinary, reproductive, endocrine & nervous systems, eye.
- **Embryology:** Gametogenesis, germ layers, embryonic development, pharyngeal arches, organ development (GI, CVS, urogenital, nervous system, eye, ear), placenta, anomalies.
- **Genetics:** Chromosomes, karyotyping, cell division, inheritance patterns, reproduction genetics.

Standard Reference Books:

1. **Gray's Anatomy for Students** – *Drake, Vogl, Mitchell*, Widely used for gross anatomy with clinical correlations, illustrations, and simplified text.
2. **Clinically Oriented Anatomy** – *Keith L. Moore, Arthur F. Dalley*, Emphasizes clinical relevance and surface anatomy; excellent for MBBS-level students.
3. **Langman's Medical Embryology** – *T.W. Sadler*,Standard textbook for embryology with clinical correlations and congenital anomalies.
4. **Atlas of Human Anatomy** – *Frank H. Netter*,High-quality anatomical illustrations; best used as a visual aid alongside core textbooks.
5. **Inderbir Singh's Textbook of Human Histology** – *Jaypee Publishers*,Student-friendly book for histology with diagrams and photomicrographs.
6. **Medical Genetics** – *G. Jorde, J. Carey, M. Bamshad*,Comprehensive and easy-to-understand text for basic medical genetics.

SYLLABUS
Ph.D. COURSE WORK
CORE / ELECTIVE Module 2: BIOCHEMISTRY

Marks: 100 Credits: 04
Duration: 60 hrs Paper code: STUBCH04

Course Objective:

1. Provide an advanced understanding of biochemical principles governing molecular and cellular functions.
2. Develop comprehensive knowledge of biomolecular interactions and core molecular mechanisms.
3. Introduce modern biochemical and molecular biology techniques relevant to research.
4. Build analytical thinking and technical competencies for academic and scientific careers.

Course Outcomes:

1. Understand biomolecular interactions, enzyme functions, and metabolic regulation.
2. Explain gene structure, expression, cell organization, and cell cycle control.
3. Analyze molecular signaling, immune response, and disease-related pathways.
4. Apply biochemical methods and interpret experimental data with quality assurance.

Course Content:

Unit 1: Biomolecules & Interactions

- **Biophysical Chemistry**: pH, buffers, thermodynamics, colligative properties, reaction kinetics
- **Bioenergetics**: Glycolysis, oxidative phosphorylation, energy coupling
- **Enzymes**: Kinetics, regulation, catalysis, isozymes
- **Protein Structure**: Ramachandran plot, secondary, tertiary, quaternary structures, motifs, domains
- **Nucleic Acids**: A, B, Z DNA; tRNA, micro-RNA
- **Metabolism**: Carbohydrates, lipids, amino acids, nucleotides, vitamins, hormones
- **Clinical Biochemistry**: Lab data interpretation, quality control

Unit 2: Cellular Processes

- **Membrane Biology**: Lipid bilayers, ion channels, pumps, transport, electrical properties
- **Organelles**: Structure and function of intracellular organelles
- **Genetic Organization**: Operon, interrupted genes, chromatin, repetitive DNA, transposons
- **Cell Division**: Mitosis, meiosis, cell cycle and its control
- **Microbial Physiology**: Growth, division, stress response

Unit 3: Molecular Mechanisms

- **DNA Processes**: Replication, repair, recombination
- **RNA Synthesis & Processing**: Transcription, splicing, capping, editing, transport
- **Protein Synthesis**: Translation, tRNA charging, modification, inhibitors

- **Gene Regulation**: Expression in prokaryotes/eukaryotes, chromatin role, gene silencing

Unit 4: Cell Signaling & Immunology

- **Host-Pathogen Interaction**: Entry, transformation, disease mechanisms
- **Cell Signaling**: GPCRs, hormones, second messengers, bacterial signaling
- **Communication**: Hematopoiesis, adhesion, gap junctions, ECM, neurotransmission
- **Cancer Biology**: Oncogenes, tumor suppressors, apoptosis, therapies
- **Immunology**: Antibodies, antigen presentation, MHC, B/T cells, hypersensitivity, vaccines

Unit 5: Techniques in Biochemistry

- **Molecular Techniques**: DNA/RNA/protein isolation, cloning, sequencing, expression
- **Immunotechniques**: ELISA, Western blot, flow cytometry, FISH
- **Biophysical Methods**: UV-Vis, NMR, fluorescence, X-ray, mass spectrometry
- **Separation Techniques**: Chromatography, electrophoresis
- **Clinical Methods**: Solution prep, dilution, biomolecule quantification

Standard Reference Books:

1. Nelson DL, Cox MM. *Lehninger principles of biochemistry*. 8th ed. New York: W.H. Freeman; 2021.
   ➞ Biomolecules, metabolism, enzymes (Units 1, 3, 5)
2. Alberts B, Johnson A, Lewis J, et al. *Molecular biology of the cell*. 7th ed. New York: Garland Science; 2022.
   ➞ Cell structure, membranes, signaling (Units 2, 4)
3. Watson JD, Baker TA, Bell SP, Gann A, Levine M, Losick R. *Molecular biology of the gene*. 7th ed. New York: Pearson Education; 2017.
   ➞ DNA/RNA, gene expression (Unit 3)
4. Murphy K, Weaver C. *Janeway's immunobiology*. 10th ed. New York: Garland Science; 2022.
   ➞ Immunity, immune response (Unit 4)
5. Owen JA, Punt J, Stranford SA. *Kuby immunology*. 9th ed. New York: W.H. Freeman; 2024.
   ➞ Basic immunology (Unit 4)
6. Wilson K, Walker J. *Principles and techniques of biochemistry and molecular biology*. 8th ed. Cambridge: Cambridge University Press; 2018.
   ➞ Lab methods, DNA/protein techniques (Unit 5)

SYLLABUS
Ph.D. COURSE WORK
CORE / ELECTIVE Module 8: MANAGEMENT STUDIES

Marks: 100 Credits: 04
Duration: 60 hrs Paper code: STUMANG04

Course Objectives

1. Understand foundational principles of management, organizational behavior, and strategic planning.
2. Develop skills in human resource functions and entrepreneurial development.
3. Gain proficiency in financial analysis, budgeting, and capital management.
4. Learn modern marketing strategies and apply statistical tools in operations management.

Course Outcomes

1. Apply management theories and decision-making tools in organizational settings.
2. Demonstrate effective HR practices and entrepreneurial planning.
3. Analyze financial statements and make informed financial decisions.
4. Utilize marketing and statistical techniques to solve real-world business problems.

Course Content:

Unit I: Management Principles and Organizational Behavior

• Management – Concepts, Processes, Theories, and Approaches
• Management Roles and Skills
• Functions – Planning, Organizing, Staffing, Coordinating, and Controlling
• Communication – Types, Processes, and Barriers
• Decision Making – Concepts, Processes, Techniques, and Tools
• Organization Structure and Design – Types, Authority, Responsibility, Centralization, Decentralization, Span of Control
• Organizational Behavior – Significance & Theories
• Individual Behavior – Personality, Perception, Values, Attitude, Learning, and Motivation
• Group Behavior – Team Building, Leadership, Group Dynamics
• Interpersonal Behavior & Transactional Analysis
• Organizational Culture & Climate
• Workforce Diversity & Cross-Cultural Organizational Behavior
• Emotions and Stress Management
• Organizational Justice and Whistle Blowing

Unit II: Human Resource Management and Entrepreneurship

• Human Resource Management – Concepts, Perspectives, Influences, and Recent Trends
• Human Resource Planning, Recruitment, and Selection
• Induction, Training, and Development
• Job Analysis, Job Evaluation, and Compensation Management
• Entrepreneurship Development – Concept, Types, Theories, and Process
• Developing Entrepreneurial Competencies, Intrapreneurship
• Women and Rural Entrepreneurship
• Innovations in Business – Types, Opportunity Identification and Screening
• Business Plan and Feasibility Analysis – Technical, Market and Financial Analysis
• Micro and Small-Scale Industries in India
• Government Role in Promoting SSI
• Sickness in Small Industries – Causes and Rehabilitation
• Institutional Finance to Small Industries – Financial Institutions, Banks, and Microfinance

Unit III: Financial and Accounting Management

• Accounting Principles and Standards
• Preparation and Analysis of Financial Statements – Ratio Analysis, Funds Flow, and Cash Flow Analysis
• Preparation of Cost Sheet, Marginal Costing
• Capital Structure – Theories, Cost of Capital, Sources of Finance
• Budgeting and Budgetary Control – Types, Process, Zero-Base Budgeting
• Value & Returns – Time Preference for Money, Valuation of Bonds and Shares, Risk and Returns
• Capital Budgeting – Nature of Investment, Evaluation, Comparison of Methods, Risk and Uncertainty Analysis
• Dividend – Theories and Determinants
• Mergers and Acquisitions – Corporate Restructuring, Value Creation, Negotiations, Leveraged Buyouts, Takeovers
• Portfolio Management – CAPM, APT
• Derivatives – Options, Payoffs, Pricing, Forward and Future Contracts
• Working Capital Management – Determinants, Cash, Inventory, Receivables and Payables Management, Factoring

Unit IV: Marketing and Strategic Management

• Strategic Management – Concepts, Processes, Decision Making and Types
• Strategy Formulation – SWOT Analysis, Corporate Strategies (Growth, Stability, Retrenchment)
• Market Segmentation, Targeting, and Positioning

• Product and Pricing Decisions – Mix, Life Cycle, Development, Pricing Strategies
• Place and Promotion Decisions – Channels, Value Networks, VMS, IMC, Advertising, Sales Promotion
• Consumer and Industrial Buying Behavior – Theories and Models
• Brand Management – Role, Equity, Models, Strategy, Extensions, Loyalty
• Logistics and Supply Chain Management – Drivers, Value Creation, Design
• Designing and Managing Sales Force, Personal Selling
• Service Marketing – Quality, Brand Management, Strategies
• Customer Relationship Marketing – Building, Values, Process
• Retail Marketing – Recent Trends, Types of Outlets
• Emerging Trends – e-Marketing, Direct, Digital, Green Marketing
• International Marketing – Entry Modes, Marketing Mix Planning

Unit V: Business Statistics and Operations Management

• Statistics for Management – Concepts, Central Tendency, Dispersion
• Probability Distributions – Binomial, Poisson, Normal, Exponential
• Data Collection and Questionnaire Design
• Sampling – Concepts, Process, Techniques
• Hypothesis Testing – Procedure, T, Z, F, Chi-square Tests
• Correlation and Regression Analysis
• Operations Management – Role and Scope
• Facility Location and Layout – Site Selection and Analysis, Layout Design and Process

References

1. Noe R, Hollenbeck J, Gerhart B, Wright P. Human Resource Management: Gaining a Competitive Advantage. New York: McGraw Hill; 2025.
2. Kotler P, Keller KL. Marketing Management. Pearson; 2014.
3. Pagare D. Principles of Management. New Delhi: Sultan Chand & Sons; 2010.
4. King D, Lawley S. Organizational Behaviour. Oxford: Oxford University Press; 2019.
5. Levine DM, Krehbiel TC, Berenson ML. Business Statistics: A First Course. Pearson; 2014.
6. Gupta OP. Fundamentals of Entrepreneurship. Agra: SBPD Publishing House; 2021.
7. Brigham EF, Ehrhardt MC. Financial Management: Theory & Practice. Boston: Cengage Learning; 2016.
8. Lynch R. Strategic Management. London: SAGE Publications Ltd; 2022.

SYLLABUS
Ph.D. COURSE WORK
CORE / ELECTIVE Module 3: MICROBIOLOGY

Marks: 100 Credits: 04
Duration: 60 hrs Paper code: STUMICR04

Course Objective:

1. Understand fundamental and advanced concepts in microbiology and immunology.
2. Gain knowledge of pathogenic microorganisms and their role in infectious diseases.
3. Learn modern diagnostic techniques and microbial identification methods.
4. Explore infection control practices and antimicrobial resistance.
5. Analyze clinical presentations of infections and their microbiological diagnosis.

Course Outcomes:

1. Explain microbial structure, function, and genetics.
2. Describe host immune responses and immunopathology.
3. Identify and differentiate major bacterial, viral, and fungal pathogens.
4. Apply knowledge of infection control and hospital microbiology.
5. Interpret laboratory findings for clinical diagnosis of infectious diseases.

Course Content:

Unit 1: General Microbiology & Immunology

- **History** of microbiology, **bacterial morphology & physiology**
- **Sterilization**, **culture methods**, **bacterial identification**
- **Bacterial genetics**, **antimicrobials** & **resistance**
- **Advanced diagnostics**: *MALDI-TOF, CB-NAAT, PCR, Blotting, Immunoassay*
- **Immunity**, **antigen-antibody reactions**, **complement system**
- **CMI & AMI**, **hypersensitivity**, **autoimmunity**, **immunodeficiency**
- **Transplant**, **cancer immunology**, **immunoprophylaxis**

Unit 2: Systematic Bacteriology

- **Gram-positive cocci**: *Staphylococcus, Streptococcus, Enterococcus*
- **Gram-negative cocci**: *Neisseria, Moraxella*
- **Gram-positive bacilli**: *Corynebacterium, Bacillus, Clostridium, Mycobacterium*
- **Gram-negative bacilli**: *E. coli, Shigella, Klebsiella, Proteus, Salmonella, Vibrio, Pseudomonas*
- **Others**: *Spirochetes (Treponema), Rickettsiae, Chlamydiae, Mycoplasma*

Unit 3: Virology & Medical Mycology

- **Virus structure**, replication, **bacteriophages**
- **DNA viruses**: *Herpesviruses, Parvoviridae, Poxviridae*
- **RNA viruses**: *HIV, Hepatitis, Arboviruses, Rhabdoviruses*
- **Oncogenic viruses**
- **Fungal infections**: *Superficial, systemic, opportunistic*, and diagnosis

Unit 4: Hospital Infection Control

- **HAIs**: Types, **surveillance**, **prevention**
- **BMW**, **needle-stick injury (NSI)**: Prevention & management
- **Antimicrobial stewardship**
- **Environmental surveillance**

Unit 5: Clinical Microbiology

- **Infections**: *Bloodstream, HAI, GI, respiratory, CNS, urogenital, congenital*
- **Emerging & re-emerging infections**
- **Diagnostic approaches** in clinical microbiology

Standard Reference Books:

1. Willey JM, Sherwood LM, Woolverton CJ. *Prescott's Microbiology*. 11th ed. New York: McGraw-Hill Education; 2021.
2. Carroll KC, Butel J, Morse SA, Mietzner T. *Jawetz, Melnick & Adelberg's Medical Microbiology*. 29th ed. New York: McGraw-Hill Education; 2022.
3. Punt J, Stranford S, Jones P, Owen JA. *Kuby Immunology*. 9th ed. New York: W.H. Freeman; 2024.
4. Garrity GM, editor. *Bergey's Manual of Systematic Bacteriology*. 2nd ed. 5 vols. New York: Springer; 2001–2012.
5. Knipe DM, Howley PM, editors. *Fields Virology*. 7th ed. Philadelphia: Wolters Kluwer; 2020.
6. de Hoog GS, Guarro J, Gené J, Gerrits van den Ende AHG, Figueras MJ, Alastruey-Izquierdo MJ. *Atlas of Clinical Fungi*. 4th ed. Utrecht: CBS-KNAW Fungal Biodiversity Centre; 2020.
7. Bennett JE, Dolin R, Blaser MJ, editors. *Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases*. 9th ed. Philadelphia: Elsevier; 2020.
8. Carroll KC, Pfaller MA, Landry ML, et al., editors. *Manual of Clinical Microbiology*. 13th ed. Washington, DC: ASM Press; 2023.

SYLLABUS
Ph.D. COURSE WORK
CORE / ELECTIVE Module 6: NURSING

Marks: 100 Credits: 04
Duration: 60 hrs Paper code: STUNUR04

Course Objective:

- Understand health policies and nursing roles.
- Develop leadership and management skills.
- Learn nursing philosophy and theories.
- Promote ethics and communication in nursing.

Course Outcomes:

- Analyze health policies and nursing impact.
- Apply leadership in nursing practice.
- Use nursing theories in practice and research.
- Practice ethical, professional nursing.
- Communicate and advocate effectively.

Course Content:

Unit I: Nursing Leadership in Healthcare Delivery Systems

- **Current Health Issues & Policies** – National & global health problems, healthcare system in India, national health and population policy, alternative medicine.
- **Nursing and Health Policy** – Nursing roles in policymaking, legal aspects, emerging nursing roles (e.g. nurse practitioner).
- **Leadership in Nursing** – Leadership theories, decision-making, change management.
- **Human Resource Management** – Planning, team management, human relations.
- **Ethics & Professionalism** – Nursing ethics, code of conduct, standards, quality assurance.
- **Advocacy & Communication** – Lobbying for nursing profession, communication skills.

Unit II: Philosophy of Nursing Science and Theoretical Perspectives

- **Introduction to Philosophy** – History of philosophy and its relevance to nursing.
- **Philosophy of Nursing Science** – Evolution of nursing as a science and discipline.
- **Nursing Knowledge Development** – Domains, paradigms, knowledge generation.
- **Philosophical Foundations** – Epistemological and ontological approaches in nursing.

Unit III: Nursing Theories and Theory Development

- **Epistemology in Nursing** – Concepts, statements, theory development strategies.
- **Theory Overview** – Importance, classification, historical context.
- **Major Nursing Theories** – Theories on clients, environment, interactions, therapeutics.
- **Theory Evaluation** – Analysis, application to practice and research.
- **Integration in Practice** – Linking theory, research, and clinical practice.

Standard Reference Books

1. Marquis BL, Huston CJ. *Leadership roles and management functions in nursing: Theory and application*. 10th ed. Philadelphia: Wolters Kluwer; 2020.
2. Milstead JA, Short NM. *Health policy and politics: A nurse's guide*. 6th ed. St. Louis: Elsevier; 2019.
3. Madhavi K. *Essentials of management for BSc nursing*. 1st ed. New Delhi: Jaypee Brothers Medical Publishers; 2012.
4. George JB. *Nursing theories: The base for professional nursing practice*. 6th ed. Boston: Pearson; 2011.
5. McEwen M, Wills EM. *Theoretical basis for nursing*. 6th ed. Philadelphia: Wolters Kluwer; 2018.
6. Alligood MR. *Nursing theorists and their work*. 9th ed. St. Louis: Elsevier; 2017.
7. Dahnke MD, Dreher HM. *Philosophy of science for nursing practice: Concepts and application*. 2nd ed. New York: Springer Publishing Company; 2015.
8. Decker JD. *Philosophical and theoretical perspectives for advanced nursing practice*. 2nd ed. Burlington: Jones & Bartlett Learning; 2015.
9. Getzen TE. *Health economics and financing*. 6th ed. Hoboken: Wiley; 2016.
10. Park K. *Park's textbook of preventive and social medicine*. 27th ed. Jabalpur: Bhanot Publishers; 2023.

SYLLABUS
Ph.D. COURSE WORK
CORE / ELECTIVE Module 4: PHARMACOLOGY

Marks: 100 Credits: 04
Duration: 60 hrs Paper Code: STUCOLY04

Course Objectives:

1. Understand basic principles of pharmacology and drug actions.
2. Learn the process of new drug development.
3. Apply pharmacokinetics and pharmacodynamics in clinical therapy.
4. Recognize and manage drug interactions.
5. Understand pharmacovigilance for patient safety.

Course Outcomes:

1. Explain molecular pharmacology and drug mechanisms.
2. Prescribe individualized drug therapy using PK/PD principles.
3. Manage drug interactions effectively.
4. Apply pharmacological knowledge to treat systemic and infectious diseases.
5. Demonstrate understanding of drugs used in cancer, dermatology, and ophthalmology.
6. Implement pharmacovigilance practices in clinical settings.

Course Content:

Unit 1: Basic Principles of Pharmacology

- **Molecular pharmacology**
- **New drug development process** (preclinical & clinical phases)
- **Pharmacokinetics**: Absorption, Distribution, Metabolism, Excretion (ADME)
- **Pharmacodynamics** and dose-response
- **Drug interactions** and clinical importance
- **Pharmacovigilance**: definition, importance, methods

Unit 2: Applied Pharmacology for Systemic Diseases

- Pharmacology of **autonomic nervous system** & neuro effector junction
- **Neuromuscular junction** and **central nervous system** drugs
- **Cardiovascular system**, **endocrine system**, **gastrointestinal system**, **respiratory system**, **reno vascular system** drugs
- **Haematological** and **immunological system** drugs
- **Autacoids** pharmacology

Unit 3: Pharmacology of Special Therapeutic Areas

- **Antimicrobial and antiparasitic drugs**: mechanisms and therapy
- **Antineoplastic (anticancer) drugs**
- Drugs for **dermatological disorders**
- Drugs for **ocular (eye) disorders**
- Special considerations in **pharmacokinetics** and **pharmacodynamics** for these areas

Standard Reference Books:

1. Katzung BG, Vanderah TW. *Basic and clinical pharmacology*. 15th ed. New York: McGraw-Hill Education; 2021.
2. Rang HP, Ritter JM, Flower RJ, Henderson G. *Rang and Dale's pharmacology*. 9th ed. London: Elsevier; 2020.
3. Brunton LL, Hilal-Dandan R, Knollmann BC, editors. *Goodman & Gilman's the pharmacological basis of therapeutics*. 13th ed. New York: McGraw-Hill Education; 2018.
4. Tripathi KD. *Essentials of medical pharmacology*. 8th ed. New Delhi: Jaypee Brothers Medical Publishers; 2018.
5. Harvey RA, Champe PC. *Lippincott's illustrated reviews: Pharmacology*. 7th ed. Philadelphia: Wolters Kluwer; 2018.
6. Bennett PN, Brown MJ, Sharma P. *Clinical pharmacology*. 12th ed. Philadelphia: Elsevier; 2017.
7. Satoskar RS, Rege NN, Bhandarkar SD. *Pharmacology and pharmacotherapeutics*. 26th ed. Mumbai: Popular Prakashan; 2021.

SYLLABUS
Ph.D. COURSE WORK
CORE / ELECTIVE Module 5: PHYSIOLOGY

Marks: 100 Credits: 04
Duration: 60 hrs Paper code: STUPHY04

Course Objectives:

1. Understand cellular, molecular, and immune physiology including biotechnology fundamentals.
2. Study electrophysiology, cardiovascular, and respiratory systems.
3. Explore nervous system, sensory, renal, digestive, and reproductive functions.
4. Apply principles of ergonomics and exercise physiology in health science.

Course Outcomes:

1. Explain key physiological processes at the cellular and molecular levels.
2. Utilize biotechnology and genetic concepts in health and research.
3. Interpret electrophysiological data and assess cardiopulmonary functions.
4. Analyze body system functions and apply ergonomics to promote health and fitness.

Course Content:

Unit 1: Cellular, Molecular, and Immune Physiology

Cell communication, signaling, and cell cycle regulation
Protein folding, enzyme kinetics, and clinical enzymology
Genome structure, transcription, translation, epigenetics
Hormonal signaling and basics of the immune system
Immunodiagnostics, hypersensitivity, and vaccine development

Unit 2: Biotechnology and Human Genetics

- Fermentation technology, microbial applications, enzyme biotechnology
- Human chromosome structure, inheritance, and genetic variation
- Genetic disorders (e.g., sickle cell anaemia, haemophilia)
- Molecular diagnosis, DNA fingerprinting, Human Genome Project

Unit 3: Electrophysiology and Cardiopulmonary Systems

- Bioelectric potentials in muscles, nerves, heart, brain
- Ion channels, electrodes, and electrophysiological techniques (EEG, ECG, EMG)
- Hemodynamics: blood flow, resistance, and BP regulation
- Cardiac cycle, electrical activity, heart sounds
- Respiratory mechanics, gas exchange, and ventilation-perfusion ratio

Unit 4: Nervous System, Senses, and Body Rhythms

- Neural plasticity, higher brain functions, memory, cognition
- Neurological disorders: Alzheimer’s, Parkinson’s, ALS
- Sensory systems: vision, hearing, taste, and smell
- Biorhythms and biological clocks

Unit 5: **Metabolism, Reproduction, and Work Physiology**

- Gastrointestinal hormones and digestive regulation
- Renal physiology: nephron, sodium exchange, renal failure
- Reproductive physiology: spermatogenesis, pregnancy, IVF
- Exercise physiology: VO2 max, fatigue, lactic acid
- Ergonomics, physiological stress, workplace safety

Standard Reference Books:

1. Guyton AC, Hall JE. *Textbook of medical physiology*. 14th ed. Philadelphia: Elsevier; 2021.
2. Barrett KE, Barman SM, Brooks HL, Yuan JXJ. *Ganong's review of medical physiology*. 26th ed. New York: McGraw-Hill Education; 2019.
3. Marieb EN, Hoehn K. *Human anatomy & physiology*. 11th ed. Hoboken: Pearson; 2018.
4. Barrett KE, Barman SM, Boitano S, Brooks HL. *Ganong's review of medical physiology*. 25th ed. New York: McGraw-Hill Education; 2016.
5. Widmaier EP, Raff H, Strang KT. *Vander's human physiology: The mechanisms of body function*. 16th ed. New York: McGraw-Hill Education; 2023.
6. Chatterjee CC. *Human physiology: Volume 1 & 2*. 13th ed. Kolkata: CBS Publishers & Distributors; 2018.
7. Guyton AC. *Medical physiology*. 8th ed. Philadelphia: W.B. Saunders Company; 1991.
8. Waugh A, Grant A. *Ross and Wilson anatomy and physiology in health and illness*. 14th ed. London: Elsevier; 2021.

SYLLABUS
Ph.D. COURSE WORK
CORE / ELECTIVE Module 7: PHYSIOTHERAPY

Marks: 100 Credits: 04
Duration: 60 hrs Paper code: STUPHT04

Course Objectives

1. Understand the normal development of musculoskeletal structures.
2. Develop clinical decision-making and evidence-based planning skills.
3. Apply biomechanics and ergonomics in clinical and occupational settings.
4. Gain proficiency in specialized physiotherapy assessment and treatment approaches.

Course Outcomes

1. Explain soft tissue mechanics and remodeling under stress.
2. Perform clinical assessments for posture, gait, and motor functions.
3. Utilize Maitland, Mulligan, and Cyriax techniques effectively.
4. Create and execute rehabilitation plans for various clinical conditions.

Course Content

Unit I: Nervous System Development & Applied Neurology

Normal Development

• Ligaments
• Cartilage
• Muscles
• Bones
• Joints

Clinical Decision-Making and Effective Planning

• Data collection
• Problem identification
• Diagnosis and prognosis
• Plan of care formulation
• Use of evidence-based knowledge
• Self-monitoring and documentation

Applied Biomechanics and Ergonomics

• Biomechanical principles related to movement
• Ergonomic assessment and implementation

Unit II: Soft Tissue Mechanics & Clinical Applications

Soft Tissue Mechanics

- Structure and function of bone, cartilage, tendons, ligaments, and muscles
- Response to mechanical stress
- Remodeling process
- Stress, strain, and modulus

Assessment Techniques

- Posture and gait assessment in normal and pathological conditions

Rehabilitation and Clinical Management

- Geriatric rehabilitation
- Principles of injury prevention and management
- Congenital and acquired orthopedic conditions in children
- Movement disorders

Unit III: Ergonomics and Physiotherapy Approaches

Ergonomics

- Definition and history
- Physical, cognitive, and organizational ergonomics
- Ergonomic methods
- Problem identification and solutions

Clinical Assessment and Evaluation

- Vital signs
- Musculoskeletal examination
- Sensory and motor function evaluation
- Motor control assessment and treatment

Physiotherapy Approaches

- Maitland
- Mulligan
- Cyriax
- Scientific basis for exercise programming

Rehabilitation Domains

- Cardiopulmonary rehabilitation
- Physiotherapy management of spinal disorders and injuries
- Athletic injuries and their physiotherapy management

References

1. Donatelli R. Orthopaedic physical therapy. London: Churchill Livingstone; 1994.
2. Sander AP. Manual of physical therapy. St. Louis: Mosby; Year Unknown.

3. Grieve GP. Common vertebral problems. London: Churchill Livingstone; Year Unknown.
4. O'Sullivan SB, Schmitz TJ. Physical rehabilitation. Philadelphia: F.A. Davis; Year Unknown.
5. Carr JH, Shepherd RB. A motor relearning programme for stroke. London: Heinemann Medical Books; Year Unknown.
6. Farber SD. Neurorehabilitation. Philadelphia: WB Saunders; Year Unknown.
7. Hardy AG, Rossier AB. Spinal cord injuries: orthopaedic and neurological aspects. New York: Churchill Livingstone; Year Unknown.
8. Riley DP. Strength training. Location and Publisher Unknown; Year Unknown.
9. Reid DC. Sports injury: assessment and rehabilitation. New York: Churchill Livingstone; Year Unknown.
10. Edwards S. Neurological physiotherapy. London: Churchill Livingstone; Year Unknown.
11. Campbell SK. Physical therapy for children. Philadelphia: WB Saunders; Year Unknown.
12. Frownfelter D, Dean E. Cardiopulmonary physical therapy. St. Louis: Mosby; Year Unknown.