Course Code	MPP101T	Title of the Course	CLINICAL PHARMACY PRACTICE	SDG Goals	L	T	P	C
Year	I	Semester	I	3 GOOD HEALTH AND WELL-BEING	4	0	0	4
Course Objectives	Upon completion of this course it is expected that students shall be able to: ▪ Understand the elements of pharmaceutical care and provide comprehensive patient care services ▪ Interpret the laboratory results to aid the clinical diagnosis of various disorders ▪ Provide integrated, critically analyzed medicine and poison information to enable healthcare professionals in the efficient ▪ patient management							

Course Outcomes	
CO1	Perform a comprehensive medication review for hospitalized patients, under the supervision of a clinical pharmacist, and identify drug-related problems using standardized protocols.
CO2	Design individualized treatment plans for patients with chronic conditions in a clinical setting, by following evidence-based guidelines, achieving alignment with prescribed therapy goals.
CO3	Monitor patient outcomes in a clinical environment, and recommend appropriate therapy modifications based on abnormal findings.
CO4	Conduct patient counseling sessions regarding medication adherence and lifestyle modifications, in an outpatient setting, ensuring effective communication as measured by patient understanding.
CO5	Evaluate the efficacy and safety of prescribed medications in real-time clinical rounds, by analyzing patient response, and suggest appropriate changes in drug therapy where therapeutic goals are not met

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO	SDG Targets
1	**Introduction to Clinical Pharmacy.** **Clinical Pharmacy Services**	**Introduction to Clinical Pharmacy:** Definition, evolution and scope of clinical pharmacy, International and national scenario of clinical pharmacy practice, Pharmaceutical care. **Clinical Pharmacy Services:** Ward round participation, Drug therapy review (Drug therapy monitoring including medication order review, chart endorsement, clinical review and pharmacist interventions).	12	1	
2	**Clinical Pharmacy Services**	Patient medication history interview, Basic concept of medicine and poison information services, Basic concept of pharmacovigilance, Hemovigilance, Materiovigilance and AEFI, Patient medication counselling, Drug utilisation evaluation, Documentation of clinical pharmacy services, Quality assurance of clinical pharmacy services.	12	2	
3	**Patient Data Analysis.** **Lab Data Interpretation**	**Patient Data & Practice Skills:** Patient's case history – its structure and significances in drug therapy management, Common medical abbreviations and terminologies used in clinical practice, Communication skills: verbal and non-verbal communications, its applications in patient care services. **Lab Data Interpretation**: Haematological tests, Renal function tests, Liver function tests.	12	3	
4	**Lab Data Interpretation**	**Lab Data Interpretation:** Tests associated with cardiac disorders, Pulmonary function tests, Thyroid function tests, Fluid and electrolyte balance, Microbiological culture sensitivity tests.	12	4	
5	**Medicines & Poison Information Services**	**Medicine Information Service:** Definition and need for medicine information service, Medicine information resources, Systematic approach in answering medicine information queries, Preparation of verbal and written response, Establishing a drug information centre. **Poison Information Service:** Definition, need, organization and functions of poison information centre.	12	5	

Reference Books

1. A Textbook of Clinical Pharmacy Practice – Essential concepts and skills –Parthasarathi G, Karin Nyfort-Hansen and Milap Nahata
2. Practice Standards and Definitions - The Society of Hospital Pharmacists of Australia
3. Basic skills in interpreting laboratory data - Scott LT, American Society of Health System Pharmacists Inc
4. Relevant review articles from recent medical and pharmaceutical literature

e-Learning Source

https://www.google.co.in/books/edition/Clinical_Pharmacy_Education_Practice_and/9Jp7DwAAQBAJ?hl=en&gbpv=1&dq=CLINICAL+pharmacy+pharm+d&printsec=frontcover

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)													
PO- PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	2	3	2	2	2	3	1	2	3
CO2	3	2	2	2	3	2	3	2	2	3	2	1	2	3
CO3	3	3	3	2	2	2	3	3	3	3	3	1	2	3
CO4	3	3	3	2	2	2	2	2	3	3	2	1	2	3
CO5	2	3	2	2	3	3	3	2	3	2	3	1	2	3

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign. of Program Coordinator	**Sign. & Seal of HoD**

Course Code	MPP102T	Title of the Course	PHARMACOTHERAPEUTICS-I	SDG Goals	L	T	P	C
Year	I	Semester	I		4	0	0	4
Course Objectives	Upon completion of this course it is expected that students shall be able to: ▪ Describe and explain the rationale for drug therapy ▪ Summarize the therapeutic approach for management of various disease conditions including reference to the latest available evidence ▪ Discuss the clinical controversies in drug therapy and evidence based medicine ▪ Prepare individualized therapeutic plans based on diagnosis ▪ Identify the patient specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time- course of clinical and laboratory indices of therapeutic response and adverse effect/s)							

Course Outcomes	
CO1	Design individualized treatment plans for patients with cardiovascular diseases in a clinical case study setting, using evidence-based guidelines, ensuring adherence to therapeutic recommendations.
CO2	Optimize drug therapy for respiratory conditions such as asthma and COPD in a hospital or outpatient setting, ensuring 80% improvement in patient outcomes through tailored interventions.
CO3	Develop management strategies for gastrointestinal disorders like GERD, IBD, and peptic ulcer disease in a clinical practice environment, achieving compliance with current clinical guidelines.
CO4	Monitor hematological parameters such as blood counts and clotting profiles in patients undergoing therapy for hematological diseases in a clinical setting, ensuring accuracy in identifying therapeutic efficacy and complications.
CO5	Formulate pharmacotherapy plans for managing bone and joint disorders like arthritis, and dermatological conditions like eczema and psoriasis, in a simulated or real-world clinical environment, ensuring therapeutic alignment with patient-specific needs.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO	SDG Targets
1	**Cardiovascular system**	Etiopathogenesis and pharmacotherapy of diseases associated with following systems: **Cardiovascular system:** Hypertension, Congestive cardiac failure, Acute coronary syndrome, Arrhythmias, Hyperlipidemias.	12	1	
2	**Respiratory system**	**Respiratory system**: Asthma, Chronic obstructive airways disease, Drug induced pulmonary diseases Endocrine system: Diabetes, Thyroid diseases	12	2	
3	**Gastrointestinal system**	**Gastrointestinal system**: Peptic ulcer diseases, Reflux esophagitis, Inflammatory bowel diseases, Jaundice & hepatitis	12	3	
4	**Gastrointestinal system.** **Hematological diseases**	**Gastrointestinal system:** Cirrhosis, Diarrhea and Constipation, Drug-induced liver disease. **Hematological diseases**: Anemia, Deep vein thrombosis, Drug induced hematological disorders.	12	4	
5	**Bone and joint disorders.** **Dermatological Diseases.** **Ophthalmology**	**Bone and joint disorders:** Rheumatoid arthritis, Osteoarthritis, Gout, Osteoporosis. **Dermatological Diseases:** Psoriasis, Eczema and scabies, impetigo, drug induced skin disorders. **Ophthalmology:** Conjunctivitis, Glaucoma.	12	5	

Reference Books
1. Roger and Walker. Clinical Pharmacy and Therapeutics – Churchill Livingstone publication.
2. Joseph T. Dipiro et al. Pharmacotherapy: A Pathophysiologic Approach- Appleton & Lange
3. Robins SL. Pathologic basis of disease -W.B. Saunders publication
4. Eric T. Herfindal. Clinical Pharmacy and Therapeutics- Williams and Wilkins Publication
5. Lloyd Young and Koda-Kimble MA Applied Therapeutics: The clinical Use of Drugs- Lippincott Williams and Wilkins.
6. Chisholm- Burns Wells Schwinghammer Malone and Joseph P Dipiro. Pharmacotherapy Principles and practice-– McGraw Hill Publication
7. Carol Mattson Porth. Principles of Pathophysiology- Lippincott Williams and Wilkins
8. Harrison's. Principles of Internal Medicine - McGraw Hill
9. Relevant review articles from recent medical and pharmaceutical literature

e-Learning Source
https://www.google.co.in/books/edition/Pocket_Handbook_of_GI_Pharmacotherapeuti/x3SjDDjlW00C?hl=en&gbpv=1&dq=Pharmacotherapeutics-III&printsec=frontcover
https://accessphysiotherapy.mhmedical.com/content.aspx?bookid=442&sectionid=40184176#6095991

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)													
PO- PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	1	2	1	2	1	1	1	2	3	1	3
CO2	3	3	3	1	2	1	2	1	1	1	2	3	1	3
CO3	3	3	3	1	2	1	2	1	1	1	2	3	1	3
CO4	3	3	3	1	2	1	2	1	1	1	2	3	1	3
CO5	3	3	3	1	2	1	2	1	1	1	2	3	1	3
	3	3	3	2	2	1	2	1	1	1	2	3	1	3

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign. of Program Coordinator	**Sign. & Seal of HoD**

Course Code	MPP103T	Title of the Course	HOSPITAL & COMMUNITY PHARMACY	SDG Goals	L	T	P	C
Year	I	Semester	I		4	0	0	4
Course Objectives	Upon completion of this course it is expected that students shall be able to: ▪ Understand the organizational structure of hospital pharmacy ▪ Understand drug policy and drug committees ▪ Know about procurement & drug distribution practices ▪ Know the admixtures of radiopharmaceuticals ▪ Understand the community pharmacy management ▪ Know about value added services in community pharmacies							

Course Outcomes	
CO1	Ensure dispensing of medications accurately in a community pharmacy setting, following prescriptions and legal regulations, achieving accuracy in dispensing.
CO2	Manage pharmacy inventory efficiently in a hospital pharmacy environment, by applying inventory control techniques and stock rotation, ensuring minimal stock wastage and stock availability.
CO3	Counsel patients on the safe and effective use of medications in a community pharmacy setting, using patient-friendly language and communication tools, with 90% of patients demonstrating understanding of their therapy regimen.
CO4	Prepare and compound extemporaneous medications in a hospital pharmacy lab, following standard compounding protocols, achieving compliance with compounding standards.
CO5	Perform medication reconciliation for patients admitted to a hospital, by reviewing patient medication histories and documenting drug-related discrepancies, with accuracy in identifying potential medication issues.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO	SDG Target
1	**Introduction to Hospitals.** **Hospital Drug Policy**	**Introduction to Hospitals** – Definition, classification, organizational structure Hospital Pharmacy: Definition, Relationship of hospital pharmacy department with other departments, Organizational structure, legal requirements, work load statistics, Infrastructural requirements, Hospital Pharmacy Budget and Hospital Pharmacy management. **Hospital Drug Policy:** Pharmacy & Therapeutics Committee, Infection Control committee, Research & Ethics Committee, Management of Medicines as per NABH.	12	1	
2	**Hospital Formulary Guidelines and its development**	**Hospital Formulary Guidelines and its development**: Developing Therapeutic guidelines, Drug procurement process, and methods of Inventory control, Methods of Drug distribution, Intravenous admixtures, Hospital Waste Management	12	2	
3	**Education and training.** **Community Pharmacy Practice.** **Community Pharmacy management**	**Education and training:** Training of technical staff, training and continuing ducation for pharmacists, Pharmacy students, Medical staff and students, Nursing staff and students, Formal and informal meetings and lectures, Drug and therapeutics newsletter. **Community Pharmacy Practice**: Definition, roles & responsibilities of community pharmacists, and their relationship with other health care providers. **Community Pharmacy management:** Legal requirements to start community pharmacy, site selection, lay out & design, drug display, super drug store model, accounts and audits, Good dispensing practices, Different softwares & databases used in community pharmacies. Entrepreneurship in community pharmacy.	12	3	
4	**Prescription** **Responding to symptoms of minor ailments.** **OTC medication.** **Medication adherence**	**Prescription** – Legal requirements & interpretation, prescription related problems. **Responding to symptoms of minor ailments:** Head ache, pyrexia, menstrual pains, food and drug allergy. **OTC medication**: Rational use of over the counter medications Medication counseling and use of patient information leaflets **Medication adherence** – Definition, factors influencing adherence behavior, strategies to improve medication adherence. Patient referrals to the doctors ADR monitoring in community pharmacies.	12	4	
5	**Health Promotion.** **National Health Programs.** **Home Medicines review program**	**Health Promotion** – Definition and health promotion activities, family planning, Health screening services, first aid, prevention of communicable and non-communicable diseases, smoking cessation, Child & mother care. **National Health Programs-** Role of Community Pharmacist in Malaria and TB control programs **Home Medicines review program** – Definition, objectives, Guidelines, method and outcomes Research in community pharmacy Practice	12	5	

Reference Books:
1. Hospital Pharmacy - Hassan WE. Lea and Febiger publication.
2. Textbook of hospital pharmacy - Allwood MC and Blackwell.
3. Avery's Drug Treatment, Adis International Limited.
4. Community Pharmacy Practice – Ramesh Adepu, BSP Publishers, Hyderabad
5. Remington Pharmaceutical Sciences
6. Relevant review articles from recent medical and pharmaceutical literature
e-Learning Source:
https://www.google.co.in/books/edition/Hospital_Pharmacy/kdAMf8f8RPwC?hl=en&gbpv=1&dq=hospital+pharmacy+pharm+d&printsec=frontcover

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)													
PO-PSO CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	2	2	2	1	1	1	1	2	1	3	3
CO2	3	3	2	2	2	2	1	1	1	1	2	2	3	3
CO3	3	3	2	2	2	2	1	1	1	1	2	3	3	2
CO4	3	3	2	2	2	2	1	1	1	1	2	2	3	2
CO5	3	3	2	2	2	2	1	1	1	1	2	1	3	2
CO6	3	3	2	2	2	2	1	1	1	1	2	2	1	1

1. Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HOD**

Course Code	MPP104T	Title of the Course	CLINICAL RESEARCH	SDG Goals	L	T	P	C
Year	I	Semester	I		4	0	0	4
Course Objectives	Upon completion of this course it is expected that students shall be able to: ▪ Know the new drug development process. ▪ Understand the regulatory and ethical requirements. ▪ Appreciate and conduct the clinical trials activities ▪ Know safety monitoring and reporting in clinical trials ▪ Manage the trial coordination process							

Course Outcomes	
CO1	Design clinical research protocols for drug trials in a simulated research setting, adhering to Good Clinical Practice (GCP) guidelines to regulatory and ethical standards.
CO2	Analyze clinical trial data using statistical software in a controlled classroom environment, demonstrating accuracy in interpreting results and drawing valid conclusions.
CO3	Assess ethical issues in clinical research by reviewing case studies involving human subjects, achieving alignment with established ethical guidelines such as the Declaration of Helsinki.
CO4	Prepare comprehensive clinical study reports in a mock research environment, meeting compliance with industry standards for report structure and content.
CO5	Critically evaluate published clinical research articles, in a journal club or peer-review setting, with accuracy in identifying study strengths, limitations, and biases.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO	SDG Target
1.	**Drug development process.** **Ethics in Biomedical Research**	**Drug development process:** Introduction, various approaches to drug discovery, Investigational new drug application submission. **Ethics in Biomedical Research:** Ethical Issues in Biomedical Research – Principles of ethics in biomedical research, Ethical committee [institutional review board] - its constitution and functions, Challenges in implementation of ethical guidelines, ICH GCP guidelines and ICMR guidelines in conduct of Clinical trials, Drug Safety Reporting.	12	1	
2.	**Types and Designs used in Clinical Research.** **Clinical Trial Study team**	**Types and Designs used in Clinical Research:** Planning and execution of clinical trials, Various Phases of clinical trials, Bioavailability and Bioequivalence studies, Randomization techniques (Simple randomization, restricted randomization, blocking method and stratification), Types of research designs based on Controlling Method (Experimental, Quasi experimental, and Observational methods) Time Sequences (Prospective and Retrospective), Sampling methods (Cohort study, case Control study and cross sectional study), Health outcome measures (Clinical & Physiological, Humanistic and economic). **Clinical Trial Study team:** Roles and responsibilities of: Investigator, Study Coordinator, Sponsor, Monitor, Contract Research Organization.	12	2	
3.	**Clinical trial Documents.** **Clinical Trial Start up activities**	**Clinical trial Documents:** Guidelines to the preparation of following documents: Protocols, Investigator's Brochure, Informed Consent Form, Case report forms, Contracts and agreements, Dairy Cards. **Clinical Trial Start up activities:** Site Feasibility Studies, Site/Investigator selection, Pre-study visit, Investigator meeting, Clinical trial agreement execution, Ethics committee document preparation and submission	12	3	
4.	**Investigational Product.** **Filing procedures.** **Clinical Trial Monitoring and Close out.** **Clinical Trial Monitoring and Close out**	**Investigational Product**: Procurement and Storage of investigation product. **Filing procedures:** Essential documents for clinical trial, Trial Master File preparation and maintenance, Investigator Site File, Pharmacy File, Site initiation visit, Conduct, Report and Follow up. **Clinical Trial Monitoring and Close out:** *Preparation and conduct of monitoring visit:* Review of source documents, CRF, ICF, IP storage, accountability and reconciliation, Study Procedure, EC communications, Safety reporting, Monitoring visit reporting and follow-up. *Close-Out visit:* Study related documents collection, Archival requirement, Investigational Product reconciliation and destruction, Close-Out visit report.	12	4	
5.	**Quality Assurance and Quality Control in Clinical Trials.** **Data Management**.	**Quality Assurance and Quality Control in Clinical Trials:** Types of audits, Audit criteria, Audit process, Responsibilities of stakeholders in audit process, Audit follow-up and documentation, Audit resolution and Preparing for FDA inspections, Fraud and misconduct management.	12	5	

		Data Management: ***Infrastructure and System Requirement for Data Management:*** Electronic data capture systems, Selection and implementation of new systems, System validation and test procedures, Coding dictionaries, Data migration and archival. ***Clinical Trial Data Management:*** Standard Operating Procedures, Data management plan, CRF & Data base design considerations, Study set-up, Data entry, CRF tracking and corrections, Data cleaning, Managing laboratory and ADR data, Data transfer and database lock, Quality Control and Quality Assurance in CDM, Data mining and warehousing.			

Reference Books:

1. Principles and practice of pharmaceutical medicine, Second edition. Authors:Lionel. D. Edward, Aadrew.J.Flether Anthony W Fos , Peter D Sloaier Publisher:Wiley;
2. Handbook of clinical research. Julia Lloyd and Ann Raven Ed. Churchill Livingstone
3. Principles of Clinical Research edited by Giovanna di Ignazio, Di Giovanna and Haynes.
4. Central Drugs Standard Control Organization. Good Clinical Practices-Guidelines for Clinical Trials on Pharmaceutical Products in India. New Delhi: Ministry of Health.
5. International Conference on Harmonisation of Technical requirements for registration of Pharmaceuticals for human use. ICH Harmonised Tripartite. Guideline. Guideline for Good Clinical Practice.E6; May 1996.
6. Ethical Guidelines for Biomedical Research on Human Subjects. Indian Council of Medical Research, New Delhi.
7. Textbook of Clinical Trials edited by David Machin, Simon Day and Sylvan Green, John Wiley and Sons.
8. Clinical Data Management edited by R K Rondels, S A Varley, C F Webbs. Second Edition, Jan 2000, Wiley Publications.
9. Goodman & Gilman: JG Hardman, LE Limbard, McGraw Hill Publications.
10. Relevant review articles from recent medical and pharmaceutical literature.

e-Learning Source:

https://www.google.co.in/books/edition/Principles_and_Practice_of_Clinical_Rese/o6F8I4LJLgC?hl=en&gbpv=1&dq=CLINICAL+RESEARCH&printsec=frontcover

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)													
PO-PSO CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	2	2	2	1	2	2	1	1	2	2	2	2
CO2	3	2	2	2	2	1	2	2	1	2	2	2	2	2
CO3	3	2	2	2	2	1	2	2	1	2	2	2	2	2
CO4	3	2	2	2	2	1	2	2	1	2	2	2	2	2
CO5	3	2	2	2	2	1	2	2	1	2	2	2	2	2
CO6	3	2	2	2	2	1	2	2	1	2	2	2	2	2

1. Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HOD**

Course Code	MPP105P	Title of the Course	PHARMACY PRACTICE PRACTICAL-I	SDG Goals	L	T	P	C
Year	I	Semester	I		0	0	12	6
Course Objectives	Upon completion of this course it is expected that students shall be able to: ▪ Understand the elements of pharmaceutical care and provide comprehensive patient care services ▪ Interpret the laboratory results to aid the clinical diagnosis of various disorders ▪ Provide integrated, critically analyzed medicine and poison information to enable healthcare professionals in the efficient ▪ patient management							

Course Outcomes	
CO1	Perform a comprehensive medication review for hospitalized patients, under the supervision of a clinical pharmacist, and identify drug-related problems using standardized protocols.
CO2	Design individualized treatment plans for patients with chronic conditions in a clinical setting, by following evidence-based guidelines, achieving alignment with prescribed therapy goals.
CO3	Monitor patient outcomes in a clinical environment, and recommend appropriate therapy modifications based on abnormal findings.
CO4	Conduct patient counseling sessions regarding medication adherence and lifestyle modifications, in an outpatient setting, ensuring effective communication as measured by patient understanding.
CO5	Evaluate the efficacy and safety of prescribed medications in real-time clinical rounds, by analyzing patient response, and suggest appropriate changes in drug therapy where therapeutic goals are not met

Unit No.	Title	Content of Unit (Total 24)	Contact Hrs.	Mapped CO	SDG Targets
1	Treatment Chart Review	One	6	1	
2	Medication History Interview	One	6	2	
3	Patient Medication Counseling	Two	6	2	
4	Drug Information Query	Two	6	2	
5	Poison Information Query	One	6	2	
6	Lab Data Interpretation	Two	6	3	
7	Presentation of clinical cases of various disease conditions adopting Pharmaceutical Care Plan Model	Eight	6	3	
8	ABC Analysis of a given list of medications	One	6	4	
9	Preparation of content of a medicine, with proper justification, for the inclusion in the hospital formulary	One	6	4	
10	Formulation and dispensing of a given IV admixtures	One	6	4	
11	Preparation of a patient information leaflet	Two	6	5	
12	Preparation of Study Protocol	One	6	5	
13	Preparation of Informed Consent Form	One	6	5	

Reference Books

1. A Textbook of Clinical Pharmacy Practice – Essential concepts and skills –Parthasarathi G, Karin Nyfort-Hansen and Milap Nahata
2. Practice Standards and Definitions - The Society of Hospital Pharmacists of Australia
3. Basic skills in interpreting laboratory data - Scott LT, American Society of Health System Pharmacists Inc
4. Relevant review articles from recent medical and pharmaceutical literature

e-Learning Source

https://www.google.co.in/books/edition/Clinical_Pharmacy_Education_Practice_and/9Jp7DwAAQBAJ?hl=en&gbpv=1&dq=CLINICAL+pharmacy+pharm+d&printsec=frontcover

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO- PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	2	3	2	2	2	3	1	2	3
CO2	3	2	2	2	3	2	3	2	2	3	2	1	2	3
CO3	3	3	3	2	2	2	3	3	3	3	3	1	2	3
CO4	3	3	3	2	2	2	2	2	3	3	2	1	2	3
CO5	2	3	2	2	3	3	3	2	3	2	3	1	2	3

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign. of Program Coordinator	Sign. & Seal of HoD

Course Code	MPP201T	Title of the Course	PRINCIPLES OF QUALITY USE OF MEDICINES	SDG Goals	L	T	P	C
Year	I	Semester	II		4	0	0	4
Course Objectives	Upon completion of this course it is expected that students shall be able to: ▪ Understand the elements of pharmaceutical care and provide comprehensive patient care services ▪ Interpret the laboratory results to aid the clinical diagnosis of various disorders ▪ Provide integrated, critically analyzed medicine and poison information to enable healthcare professionals in the efficient patient management							

Course Outcomes	
CO1	Evaluate medication appropriateness for patients with chronic conditions in a clinical case study setting, ensuring accuracy in identifying drug-related problems according to evidence-based guidelines.
CO2	Promote rational drug use in a community or hospital setting, through patient education and awareness programs, achieving adherence to recommended therapy by patients.
CO3	Develop individualized medication management plans for elderly or high-risk patients in a clinical environment, based on current therapeutic guidelines, ensuring compliance with the quality use of medicines framework.
CO4	Monitor and report adverse drug reactions in a hospital or outpatient setting, using standard reporting protocols, with accuracy in ADR identification and documentation.
CO5	Implement strategies for managing polypharmacy in a primary care setting, by conducting medication reviews and patient interviews, ensuring success in optimizing therapy and reducing inappropriate medication use

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO	SDG Targets
1	**Introduction to Quality use of medicines (QUM)**	**Introduction to Quality use of medicines (QUM):** Definition and Principles of QUM, Key partners and responsibilities of the partners, Building blocks in QMC, Evaluation process in QMC, Communication in QUM, Cost effective prescribing.	12	1	
2	**Concepts in QUM Evidence based medicine**	**Concepts in QUM Evidence based medicine:** Definition, concept of evidence based medicine, Approach and practice of evidence based medicine in clinical settings. **Essential drugs:** Definition, need, concept of essential drug, National essential drug policy and list. **Rational drug use:** Definition, concept and need for rational drug use, Rational drug prescribing, Role of pharmacist in rational drug use.	12	2	
3	**QUM in various settings.** **QUM in special population**	**QUM in various settings**: Hospital settings, Ambulatory care/Residential care, Role of health care professionals in promoting the QUM, Strategies to promote the QUM, Impact of QUM on E-health, integrative medicine and multidisciplinary care. **QUM in special population:** Pediatric prescribing, Geriatric prescribing, Prescribing in pregnancy and lactation, Prescribing in immune compromised and organ failure patients.	12	3	
4	**Regulatory aspects of QUM in India.**	**Regulatory aspects of QUM in India:** Regulation including scheduling, Regulation of complementary medicines, Regulation of OTC medicines, Professional responsibility of pharmacist, Role of industry in QUM in medicine development	12	4	
5	**Medication errors.** **Pharmacovigilance**	**Medication errors:** Definition, categorization and causes of medication errors, Detection and prevention of medication errors, Role of pharmacist in monitoring and management of medication errors **Pharmacovigilance:** Definition, aims and need for pharmacovigilance, Types, predisposing factors and mechanism of adverse drug reactions (ADRs), Detection, reporting and monitoring of ADRs, Causality assessment of ADRs, Management of ADRs, Role of pharmacist in pharmacovigilance.	12	5	

Reference Books

1. A Textbook of Clinical Pharmacy Practice – Essential concepts and skills –Parthasarathi G, Karin Nyfort-Hansen and Milap Nahata
2. Andrews EB, Moore N. Mann's Pharmacovigilance.
3. Dipiro JT, Talbert RL, Yee GC. Pharmacotherapy: A Pathophysiologic Approach
4. Straus SE, Richardson WS, Glasziou P, Haynes RB. Evidence-Based Medicine: How to practice and teach it
5. Cohen MR. Medication Errors
6. Relevant review articles from recent medical and pharmaceutical literature.

e-Learning Source
▪ http://medicinesaustralia.com.au/files/2012/05/MA_QUM_External_Reduced.pdf
▪ http://curriculum.racgp.org.au/statements/quality-use-of-medicines/
▪ http://www.rug.nl/research/portal/files/14051541/Chapter_2.pdf

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)													
PO- PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	2	3	2	2	2	3	1	2	3
CO2	3	2	2	2	3	2	3	2	2	3	2	1	2	3
CO3	3	3	3	2	2	2	3	3	3	3	3	1	2	3
CO4	3	3	3	2	2	2	2	2	3	3	2	1	2	3
CO5	2	3	2	2	3	3	3	2	3	2	3	1	2	3

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign. of Program Coordinator	**Sign. & Seal of HoD**

Course Code	MPP202T	Title of the Course	PHARMACOTHERAPEUTICS-II	SDG Goals	L	T	P	C
Year	I	Semester	I		4	0	0	4
Course Objectives	Upon completion of this course it is expected that students shall be able to: ▪ Describe and explain the rationale for drug therapy ▪ Summarize the therapeutic approach for management of various disease conditions including reference to the latest available evidence. ▪ Discuss the clinical controversies in drug therapy and evidence based medicine ▪ Prepare individualized therapeutic plans based on diagnosis ▪ Identify the patient specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time- course of clinical and laboratory indices of therapeutic response and adverse effect/s)							

Course Outcomes	
CO1	Develop comprehensive pharmacotherapy plans for patients with neurological disorders such as epilepsy, Parkinson's disease, stroke, headache, Alzheimer's disease, neuralgias and pain pathways and pain management in a clinical case study setting, ensuring adherence to current evidence-based guidelines.
CO2	Implement individualized treatment strategies for patients with psychiatric disorders including schizophrenia, depression, anxiety disorders, sleep disorders, drug induced psychiatric disorders renal system: acute renal failure, chronic renal failure, renal dialysis, drug induced renal disease etc., in a hospital or community mental health setting, achieving improvement in patient-reported outcomes.
CO3	Assess and manage infectious disorders through general guidelines for the rational use of antibiotics and surgical prophylaxis and appropriate pharmacotherapy of urinary tract infections, respiratory tract infections, gastroenteritis, tuberculosis, malaria, bacterial endocarditis, and septicemia for antimicrobial use and monitoring.
CO4	Formulate effective treatment approaches for infectious diseases such as meningitis, HIV and opportunistic infections, rheumatic fever, dengue fever, H1N1, helmenthiasis, fungal infections; and gynecological disorders such as dysmenorrhea, hormone replacement therapy etc. in a primary care or specialty clinic setting, achieving patient satisfaction and adherence rates.
CO5	Evaluate and recommend oncology treatment protocols for patients undergoing cancer chemotherapy in a clinical oncology setting, ensuring accuracy in selecting appropriate therapies based on current clinical trials and guidelines.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO	SDG Targets
1	**Nervous system**	**Nervous system:** Epilepsy, Parkinson's disease, Stroke, Headache, Alzheimer's disease, Neuralgias and Pain pathways and Pain management.	12	1	
2	**Psychiatric disorders**	**Psychiatric disorders:** Schizophrenia, Depression, Anxiety disorders, Sleep disorders, Drug induced psychiatric disorders Renal system: Acute renal failure, Chronic renal failure, Renal dialysis, Drug induced renal disease	12	2	
3	**Infectious diseases**	**Infectious diseases**: General guidelines for the rational use of antibiotics and surgical prophylaxis, Urinary tract infections, Respiratory tract infections, Gastroenteritis, Tuberculosis, Malaria, Bacterial endocarditis, Septicemia.	12	3	
4	**Infectious diseases. Gynecological disorders**	**Infectious diseases**: Meningitis, HIV and opportunistic infections, Rheumatic fever, Dengue fever, H1N1, Helmenthiasis, Fungal infections. **Gynecological disorders**: Dysmenorrhea, Hormone replacement therapy.	12	4	
5	**Oncology**	**Oncology:** General principles of cancer chemotherapy, pharmacotherapy of breast cancer, lung cancer, head & neck cancer, hematological malignancies, Management of nausea and vomiting, Palliative care	12	5	

Reference Books

1. Roger and Walker. Clinical Pharmacy and Therapeutics – Churchill Livingstone publication.
2. Joseph T. Dipiro et al. Pharmacotherapy: A Pathophysiologic Approach- Appleton & Lange
3. Robins SL. Pathologic basis of disease -W.B. Saunders publication
4. Eric T. Herfindal. Clinical Pharmacy and Therapeutics- Williams and Wilkins Publication
5. Lloyd Young and Koda-Kimble MA Applied Therapeutics: The clinical Use of Drugs- Lippincott Williams and Wilkins.
6. Chisholm- Burns Wells Schwinghammer Malone and Joseph P Dipiro. Pharmacotherapy Principles and practice-– McGraw Hill Publication
7. Carol Mattson Porth. Principles of Pathophysiology- Lippincott Williams and Wilkins
8. Harrison's. Principles of Internal Medicine - McGraw Hill
9. Relevant review articles from recent medical and pharmaceutical literature

e-Learning Source

https://www.google.co.in/books/edition/Pocket_Handbook_of_GI_Pharmacotherapeuti/x3SjDDjlW00C?hl=en&gbpv=1&dq=Pharmacotherapeutics-III&printsec=frontcover

https://accessphysiotherapy.mhmedical.com/content.aspx?bookid=442&sectionid=40184176#6095991

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)													
PO- PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	1	2	1	2	1	1	1	2	3	1	3
CO2	3	3	3	1	2	1	2	1	1	1	2	3	1	3
CO3	3	3	3	1	2	1	2	1	1	1	2	3	1	3
CO4	3	3	3	1	2	1	2	1	1	1	2	3	1	3
CO5	3	3	3	1	2	1	2	1	1	1	2	3	1	3
	3	3	3	2	2	1	2	1	1	1	2	3	1	3

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign. of Program Coordinator	**Sign. & Seal of HoD**

Course Code	MPP203T	Title of the Course	CLINICAL PHARMACOKINETICS AND THERAPEUTIC DRUG MONITORING	SDG Goals	L	T	P	C
Year	I	Semester	II		4	0	0	4
Course Objectives	Upon completion of this course it is expected that students shall be able to: ▪ Design the drug dosage regimen for individual patients ▪ Interpret and correlate the plasma drug concentrations with patients' therapeutic outcomes ▪ Recommend dosage adjustment for patients with renal/ hepatic impairment ▪ Recommend dosage adjustment for paediatrics and geriatrics ▪ Manage pharmacokinetic drug interactions ▪ Apply pharmacokinetic parameters in clinical settings ▪ Interpret the impact of genetic polymorphisms of individuals on pharmacokinetics and or pharmacodynamics of drugs ▪ Do pharmacokinetic modeling for the given data using the principles of pharmacometrics							

Course Outcomes	
CO1	Apply pharmacokinetic principles to adjust drug dosages for individual patients in a clinical case study setting, achieving accuracy in dose adjustments based on patient-specific factors.
CO2	Perform therapeutic drug monitoring (TDM) for drugs with a narrow therapeutic index in a hospital environment, ensuring accuracy in interpreting drug concentration levels and adjusting therapy accordingly.
CO3	Analyze pharmacokinetic data from patient records in a clinical simulation, demonstrating proficiency in calculating parameters such as clearance, volume of distribution, and half-life.
CO4	Identify factors that affect drug pharmacokinetics (e.g., age, renal or hepatic function, and drug interactions) in a clinical practice setting, with accuracy in modifying drug regimens based on these factors.
CO5	Optimize drug therapy based on TDM results for patients on chronic therapy in a hospital or outpatient setting, ensuring alignment with therapeutic goals while minimizing toxicity.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO	SDG Targets
1	**Introduction to Clinical pharmacokinetics.** **Designing of dosage regimens**	**Introduction to Clinical pharmacokinetics**: Compartmental and Non compartmental models, Renal and non-renal clearance, Organ extraction and models of hepatic clearance, Estimation and determinants of bioavailability, Multiple dosing, Calculation of loading and maintenance doses. **Designing of dosage regimens**: Determination of dose and dosing intervals, Conversion from intravenous to oral dosing, Nomograms and Tabulations in designing dosage regimen.	12	1	
2	**Pharmacokinetics of Drug Interaction.** **Pharmacogenetics.** **Introduction to Pharmacometrics**	**Pharmacokinetics of Drug Interaction:** Pharmacokinetic drug interactions, Inhibition and Induction of Drug metabolism, Inhibition of Biliary Excretion **Pharmacogenetics:** Genetic polymorphism in Drug metabolism: Cytochrome P-450 Isoenzymes, Genetic Polymorphism in Drug Transport and Drug Targets, Pharmacogenetics and Pharmacokinetic / Pharmacodynamic considerations **Introduction to Pharmacometrics**: Introduction to Bayesian Theory, Adaptive method or Dosing with feedback, Analysis of Population pharmacokinetic Data.	12	2	
3	**Non Linier Mixed Effects Modelling**	**Non Linier Mixed Effects Modelling:** The Structural or Base Model, Modeling Random Effects, Modeling Covariate Relationships, Mixture Model, Estimation Methods, Model Building Techniques, Covariate Screening Methods, Testing the model assumptions, Precision of the parameter estimates and confidence intervals, Model misspecification and violation of the model assumptions, Model Validation, Simulation of dosing regimens and dosing recommendations, Pharmacometrics software.	12	3	
4	**Altered Pharmacokinetics**	**Altered Pharmacokinetics**: Drug dosing in the elderly, Drug dosing in the paediatrics, Drug dosing in the obese patients, Drug dosing in the pregnancy and lactation, Drug dosing in the renal failure and extracorporeal removal of drugs, Drug dosing in the in hepatic failure.	12	4	
5	**Therapeutic Drug monitoring** **Cardiovascular disease.** **Seizure disorders.** **Psychiatric conditions.** **Organ transplantations.** **Antibiotics**	**Therapeutic Drug monitoring:** Introduction, Individualization of drug dosage regimen (Variability – Genetic, age, weight, disease and Interacting drugs), Indications for TDM, Protocol for TDM, Pharmacokinetic/Pharmacodynamic Correlation in drug therapy. ***TDM of drugs used in the following conditions:*** **Cardiovascular disease:** Digoxin, Lidocaine, Amiodarone; **Seizure disorders:** Phenytoin, Carbamazepine, Sodium Valproate; **Psychiatric conditions:** Lithium, Fluoxetine, Amitriptyline; **Organ transplantations**: Cyclosporine; Cytotoxic Agents: Methotrexate, 5-FU, Cisplatin. **Antibiotics**: Vancomycin, Gentamicin, Meropenem.	12	5	

Reference Books
1. Leon Shargel, Susanna Wu-Pong, Andrew Yu. Applied Biopharmaceutics & Pharmacokinetics. New York: Mc Graw Hill.
2. Peter L. Bonate. Pharmacokinetic - Pharmacodynamic Modeling and Simulation. Springer Publications.
3. Michael E. Burton, Leslie M. Shaw, Jerome J. Schentag, William E.Evans. Applied Pharmacokinetics & Pharmacodynamics: Principles of Therapeutic Drug Monitoring. Iippincott Williams & Wilkins.
4. Steven How-Yan Wong, Irving Sunshine. Handbook of Analytical Therapeutic Drug Monitoring and Toxicology. CRC Press, USA.
5. Soraya Dhillon, Andrzej Kostrzewski. Clinical pharmacokinetics. 1st edition. London: Pharmaceutical Press.
6. Joseph T.Dipiro, William J.Spruill, William E.Wade, Robert A.Blouin and Jane M.Pruemer .Concepts in Clinical Pharmacokinetics. American Society of Health-System Pharmacists, USA.
7. Malcolm Rowland, Thomas N. Tozer .Clinical Pharmacokinetics and pharmacodynamics: concepts and applications. Iippincott Williams & Wilkins, USA.
8. Evans, Schentag, Jusko. Applied pharmacokinetics. American Society of Health system Pharmacists, USA.
9. Michael E. Winter. Basic Clinical Pharmacokinetics. Iippincott Williams & Wilkins, USA.
10. Milo Gibaldi. Biopharmaceutics and Clinical Pharmacokinetics. Pharma Book Syndicate, USA.
11. Dhillon and Kostrzewski. Clinical pharmacokinetics. Pharmaceutical Press, London.
12. John E .Murphy. Clinical Pharmacokinetics. 5th edition. US: American Society of Health- System Pharmacist, USA.
13. Relevant review articles from recent medical and pharmaceutical literature.

e-Learning Source
https://accesspharmacy.mhmedical.com/content.aspx?sectionid=41488039&bookid=513
https://www.futurelearn.com/courses/pharmacokinetics-and-dosing-regimen-in-renal-disease

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)													
PO- PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	1	-	-	1	-	-	2	1	1	1	1	1	3
CO2	2	1	1	2	2	-	1	2	1	1	2	1	1	3
CO3	2	-	-	3	2	-	2	2	2	1	2	2	1	3
CO4	3	3	-	2	2	-	2	2	3	1	3	3	1	3
CO5	2	2	-	2	2		3	2	3	1	2	1	1	3

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign. of Program Coordinator	**Sign. & Seal of HoD**

Course Code	MPP204T	Title of the Course	PHARMACOEPIDEMIOLOGY & PHARMACOECONOMICS	SDG Goals	L	T	P	C
Year	I	Semester	II		4	0	0	4
Course Objectives	Upon completion of this course it is expected that students shall be able to: ▪ Understand the various epidemiological methods and their applications ▪ Understand the fundamental principles of Pharmacoeconomics. ▪ Identify and determine relevant cost and consequences associated with pharmacy products and services. ▪ Perform the key Pharmacoeconomics analysis methods ▪ Understand the Pharmacoeconomic decision analysis methods and its applications. ▪ Describe current Pharmacoeconomic methods and issues. ▪ Understand the applications of Pharmacoeconomics to various pharmacy settings.							

Course Outcomes	
CO1	Design and conduct pharmacoepidemiological studies in a simulated research setting, ensuring adherence to appropriate study designs and epidemiological methods.
CO2	Analyze drug utilization data from real-world healthcare databases in a classroom or lab environment, with accuracy in identifying trends and patterns of drug use.
CO3	Perform pharmacoeconomic evaluations, including cost-effectiveness and cost-benefit analyses, in a simulated healthcare setting, achieving accuracy in calculating and interpreting economic outcomes of drug therapies.
CO4	Assess the impact of public health policies on drug use and patient outcomes using case studies or healthcare data, with proficiency in identifying policy-related changes in drug utilization patterns.
CO5	Evaluate published pharmacoeconomic studies in a journal club or review setting, ensuring accuracy in assessing the validity and applicability of study findings to healthcare decision-making

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO	SDG Target
1.	**Introduction to Pharmacoepidemiology.** **Outcome measurement.** **Drug use measures.** **Concept of risk.**	**Introduction to Pharmacoepidemiology:** Definition, Scope, Need, Aims & Applications. **Outcome measurement:** Outcome measures. **Drug use measures:** Monetary units, Number of prescriptions, units of drug dispensed, defined daily doses, prescribed daily doses, Diagnosis and Therapy surveys, Prevalence, Incidence rate, Monetary units, number of prescriptions, unit of drugs dispensed, defined daily doses and prescribed daily doses, medications adherence measurements. **Concept of risk:** Measurement of risk, Attributable risk and relative risk, Time-risk relationship and odds ratio.	12	1	
2.	**Pharmacoepidemiological Methods** **Calculation of Odds ratio.** **Meta analysis models.** **Drug effects study in populations.** **Applications of Pharmacoepidemiology**	**Pharmacoepidemiological Methods:** *Qualitative models:* Drug Utilization Review. *Quantitative models:* case reports, case series, Cross sectional studies, Cohort and case control studies. **Calculation of Odds' ratio.** **Meta analysis models.** **Drug effects study in populations:** Spontaneous reporting, Prescription event monitoring, Post marketing surveillance, Record linkage systems. **Applications of Pharmacoepidemiology.**	12	2	
3.	**Introduction to Pharmacoeconomics.** **Cost categorization and resources for cost estimation.** **Outcomes and Measurements of Pharmacoeconomics**	**Introduction to Pharmacoeconomics:** Definition, history of Pharmacoeconomics, Need of Pharmacoeconomic studies in Indian healthcare system. **Cost categorization and resources for cost estimation:** Direct costs, Indirect costs. Intangible costs. **Outcomes and Measurements of Pharmacoeconomics**: *Types of outcomes:* Clinical outcome, Economic outcomes, Humanistic outcomes; Quality Adjusted Life Years, Disability Adjusted Life Years Incremental Cost Effective Ratio, Average Cost Effective Ratio. Person Time, Willingness To Pay, Time Trade Off and Discounting.	12	3	
4.	**Pharmacoeconomic evaluations** **Pharmacoeconomic models**	**Pharmacoeconomic evaluations** ***Definition, Steps involved, Applications, Advantages and disadvantages of the following Pharmacoeconomic models:*** Cost Minimization Analysis (CMA), Cost Benefit Analysis (CBA), Cost Effective Analysis (CEA), Cost Utility Analysis (CUA), Cost of Illness (COI), Cost Consequences Analysis (COA).	12	4	
5.	**Pharmacoeconomic models** **Applications of Pharmacoeconomics**	***Definition, Steps involved, Applications, Advantages and disadvantages of the following:*** Health related quality of life (HRQOL): Definition, Need for measurement of HRQOL, Common HRQOL measures. ***Definition, Steps involved, Applications of the following:*** Decision Analysis and Decision tree, Sensitivity analysis, Markov Modeling, Software used in pharmacoeconomic analysis, Applications of Pharmacoeconomics.	12	5	
Reference Books:					

1. Rascati K L. Essentials of Pharmacoeconomics, Woulters Kluwer Lippincott Williams & Wilkins, Philadelphia.
2. Thomas E Getzen. Health economics. Fundamentals and Flow of Funds. John Wiley & Sons, USA.
3. Andrew Briggs, Karl Claxton, Mark Sculpher. Decision Modelling for Health. Economic Evaluation, Oxford University Press, London.
4. Michael Drummond, Mark Sculpher, George Torrence, Bernie O'Brien and Greg Stoddart. Methods for the Economic Evaluation of Health Care Programmes Oxford University Press, London.
5. George E Mackinnon III. Understanding health outcomes and pharmacoeconomics.
6. Graker, Dennis. Pharmacoeconomics and outcomes.
7. Walley, Pharmacoeconomics.
8. Pharmacoeconomic – ed. by Nowakowska – University of Medical Sciences, Poznan.
9. Relevant review articles from recent medical and pharmaceutical literature
e-Learning Source:
https://pharmareview.files.wordpress.com/2011/10/pharmacoepidemiology.pdf
https://pharmacystblog.files.wordpress.com/2019/05/textbook-of-pharmacoepidemiology.pdf

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)													
PO-PSO CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	2	3	3	2	3	2	2	3	2	2	3	3
CO2	3	2	3	2	2	3	2	2	2	2	3	3	2	2
CO3	3	2	2	3	2	3	2	3	3	3	2	2	3	2
CO4	3	2	3	2	2	3	2	2	3	3	3	3	2	2
CO5	3	2	3	3	3	2	2	3	3	2	3	3	3	3
CO6	2	2	2	2	1	1	1	1	2	2	1	2	3	2

1. Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HOD**

Course Code	MPP205P	Title of the Course	PHARMACY PRACTICE PRACTICAL-II	SDG Goals	L	T	P	C
Year	I	Semester	I		0	0	12	6
Course Objectives	Upon completion of this course it is expected that students shall be able to: ▪ Understand the elements of pharmaceutical care and provide comprehensive patient care services ▪ Interpret the laboratory results to aid the clinical diagnosis of various disorders ▪ Provide integrated, critically analyzed medicine and poison information to enable healthcare professionals in the efficient ▪ patient management							

Course Outcomes	
CO1	Perform a comprehensive medication review for hospitalized patients, under the supervision of a clinical pharmacist, and identify drug-related problems using standardized protocols.
CO2	Design individualized treatment plans for patients with chronic conditions in a clinical setting, by following evidence-based guidelines, achieving alignment with prescribed therapy goals.
CO3	Monitor patient outcomes in a clinical environment, and recommend appropriate therapy modifications based on abnormal findings.
CO4	Conduct patient counseling sessions regarding medication adherence and lifestyle modifications, in an outpatient setting, ensuring effective communication as measured by patient understanding.
CO5	Evaluate the efficacy and safety of prescribed medications in real-time clinical rounds, by analyzing patient response, and suggest appropriate changes in drug therapy where therapeutic goals are not met

Unit No.	Title	Content of Unit (Total 24)	Contact Hrs.	Mapped CO	SDG Targets
1	Causality assessment of adverse drug reactions	Three	6	1	
2	Detection and management of medication errors	Three	6	1	
3	Rational use of medicines in special population	Three	6	2	
4	Presentation of clinical cases of various disease conditions adopting Pharmaceutical Care Plan Model	Eight	6	3	
5	Calculation of Bioavailability and Bioequivalence from the given data	Two	6	3	
6	Interpretation of Therapeutic Drug Monitoring reports of a given patient	Three	6	4	
7	Calculation of various Pharmacoeconomic outcome analysis for the given data	Two	6	5	

Reference Books

1. A Textbook of Clinical Pharmacy Practice – Essential concepts and skills –Parthasarathi G, Karin Nyfort-Hansen and Milap Nahata
2. Practice Standards and Definitions - The Society of Hospital Pharmacists of Australia
3. Basic skills in interpreting laboratory data - Scott LT, American Society of Health System Pharmacists Inc
4. Relevant review articles from recent medical and pharmaceutical literature

e-Learning Source

https://www.google.co.in/books/edition/Clinical_Pharmacy_Education_Practice_and/9Jp7DwAAQBAJ?hl=en&gbpv=1&dq=CLINICAL+pharmacy+pharm+d&printsec=frontcover

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO- PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	2	3	2	2	2	3	1	2	3
CO2	3	2	2	2	3	2	3	2	2	3	2	1	2	3
CO3	3	3	3	2	2	2	3	3	3	3	3	1	2	3
CO4	3	3	3	2	2	2	2	2	3	3	2	1	2	3
CO5	2	3	2	2	3	3	3	2	3	2	3	1	2	3

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign. of Program Coordinator	Sign. & Seal of HoD

Course Code	MRM301T	Title of the Course	RESEARCH METHODOLOGY & BIOSTATISTICS	SDG Goals	L	T	P	C
Year	II	Semester	I		4	0	0	4
Course Objectives	Upon completion of this course it is expected that students shall be able to: ▪ Explain the basic requirements for designing the research project. ▪ Demonstrate the types of statistical methods. ▪ Explain the CPCSEA guidelines for keeping the laboratory animals. ▪ Explain the different ethical principles for conducting the clinical trials. ▪ Explain the principles declaration of Helsinki and ICG guidelines							

Course Outcomes	
CO1	Design research proposals in a simulated or actual research setting, following scientific principles and ethical guidelines, ensuring adherence to established research methodologies.
CO2	Apply appropriate biostatistical tools to analyze data from clinical or experimental studies, using statistical software in a classroom or lab setting, achieving accuracy in data interpretation and hypothesis testing.
CO3	Formulate clear and testable research hypotheses in a structured academic setting, using problem statements from healthcare and pharmaceutical research, ensuring clarity and relevance in hypothesis construction.
CO4	Evaluate published research papers in scientific journals using biostatistical criteria and study design quality, demonstrating accuracy in identifying strengths, weaknesses, and biases.
CO5	Calculate appropriate sample sizes for various types of research designs in a statistical lab setting, ensuring accuracy in determining the required sample size for reliable and valid results.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO	SDG Targets
1	**General Research Methodology**	Research, objective, requirements, practical difficulties, review of literature, study design, types of studies, strategies to eliminate errors/bias, controls, randomization, crossover design, placebo, blinding techniques.	12	1	
2	**Biostatistics**	Definition, application, sample size, importance of sample size, factors influencing sample size, dropouts, statistical tests of significance, type of significance tests, parametric tests(students "t" test, ANOVA, Correlation coefficient, regression), non–parametric tests (wilcoxan rank tests, analysis of variance, correlation, chi square test), null hypothesis, P values, degree of freedom, interpretation of P values.	12	2	
3	**Medical Research**	History, values in medical ethics, autonomy, beneficence, non–maleficence, double effect, conflicts between autonomy and beneficence/non–maleficence, euthanasia, informed consent, confidentiality, criticisms of orthodox medical ethics, importance of communication, control resolution, guidelines, ethics committees, cultural concerns, truth telling, online business practices, conflicts of interest, referral, vendor relationships, treatment of family members, sexual relationships, fatality.	12	3	
4	**CPCSEA guidelines for laboratory animal facility**	Goals, veterinary care, quarantine, surveillance, diagnosis, treatment and control of disease, personal hygiene, location of animal facilities to laboratories, anesthesia, euthanasia, physical facilities, environment, animal husbandry, record keeping, SOPs, personnel and training, transport of lab animals.	12	4	
5	**Declaration of Helsinki**	History, introduction, basic principles for all medical research, and additional principles for medical research combined with medical care.	12	5	

Reference Books

Central Drugs Standard Control Organization– Good Clinical Practices, Guidelines for Clinical Trials on Pharmaceutical Products in India. New Delhi: Ministry of Health;2001.

International Conference on Harmonization of Technical requirements for registration of Pharmaceuticals for human use. ICH Harmonized Tripartite Guideline. Guideline for Good Clinical Practice.E6; May 1996.

Ethical Guidelines for Biomedical Research on Human Subjects 2000. Indian Council of Medical Research, New Delhi.

Textbook of Clinical Trials edited by David Machin, Simon Day and Sylvan Green, March 2005, John Wiley and Sons.

e-Learning Source:

https://drive.google.com/drive/folders/1W4b4NRhqBQWMC14vsBNZcdc2LWFFmcrd?usp=share_link

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)													
PO-PSO CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	3	3	3	3	3	2	3	3	3	3	2	3
CO2	3	3	3	3	3	2	2	3	2	2	2	2	3	3
CO3	3	2	2	2	2	2	3	1	3	3	3	3	3	3
CO4	3	3	3	3	3	2	2	2	3	2	2	3	3	3
CO5	3	2	3	3	1	1	3	1	2	3	3	2	2	3

1. Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HOD**