



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

M.PHARM. IN PHARMACY PRACTICE

COURSE STRUCTURE & SYLLABI

SEMESTER – I

S. No.	Course code	Course Name	Hours per week			Credits
			L	T	P	
1.	21S09101	Pharmacotherapeutics-I	4	-	-	4
2.	21S09102	Clinical Pharmacy Practice	4	-	-	4
3.	21S09103	Hospital & Community Pharmacy	4	-	-	4
4.	21S09104	Clinical Research	4	-	-	4
5.	21S09105	Pharmacotherapeutics-I Lab	-	-	6	3
6.	21S09106	Clinical Pharmacy Practice Lab	-	-	6	3
7.	21DAC101a 21DAC101b 21DAC101c	Audit Course – I English for Research paper writing Disaster Management Sanskrit for Technical Knowledge	2	-	-	0
8.	21S09107	Seminar/Assignment	-	1	6	4
		Total	18	1	18	26

SEMESTER – II

S.No.	Course code	Course Name	Hours per week			Credits
			L	T	P	
1.	21S09201	Pharmacotherapeutics- II	4	-	-	4
2.	21S09202	Clinical Pharmacokinetics and Therapeutic Drug Monitoring	4	-	-	4
3.	21S09203	Principles of Quality Use of Medicines	4	-	-	4
4.	21SOE301e	Pharmacoepidemiology & Pharmacoconomics	4	-	-	4
5.	21S09204	Pharmacotherapeutics -II Lab	-	-	6	3
6.	21S09205	Clinical Pharmacokinetics and Therapeutic Drug Monitoring Lab	-	-	6	3
7.	21DAC201a 21DAC201b 21DAC201c	Audit Course – II Pedagogy Studies Stress Management from Yoga Personality Development through Life Enlightenment Skills	2	-	-	0
8.	21S09206	Seminar/Assignment	-	1	6	4
		Total	18	1	18	26



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SEMESTER - III

S.No.	Course code	Course Name	Hours per			Credits
				T	P	
1.	21DRM101	Research Methodology and Intellectual Property Rights	4	-	-	4
2.	21SOE301a 21SOE301b 21SOE301c	Open Electives Pharmaceutical Validation Biostatistics Entrepreneurship Management	3	-	-	3
3.	21S09301	Teaching Practice/Assignment	-	-	4	2
4.	21S09302	Comprehensive viva voce	-	-	-	2
5.	21S09303	Research Work – I	-	-	24	12
		Total	7	-	32	23

SEMESTER - IV

S.No.	Course code	Course Name	Hours per			Credits
			L	T	P	
1.	21S09401	Co-Curricular Activities	2	-	-	2
2.	21S09402	Research Work - II	3	-	30	18
		Total	5	-	30	20



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Course Code	PHARMACOTHERAPEUTICS- I	L	T	P	C
		21S09101	4	0	0
Semester		I			
Course Objectives:					
This course aims to enable the students to understand the different treatment approaches in managing various disease conditions. Also, it imparts knowledge and skills in optimizing drug therapy of a patient by individualizing the treatment plan through evidence-based medicines					
Course Outcomes (CO): Student will be able to					
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). Etiopathogenesis and pharmacotherapy of diseases associated with following systems					
UNIT - I					
Cardiovascular system: Hypertension, Congestive cardiac failure, Acute coronary syndrome, Arrhythmias, Hyperlipidemias. Haematological diseases: Anaemia, Deep vein thrombosis, Drug induced hematological disorders.					
UNIT - II					
Respiratory system: Asthma, Chronic obstructive airways disease, Drug induced pulmonary diseases Endocrine system: Diabetes, Thyroid diseases					
UNIT - III					
Gastrointestinal system: Peptic ulcer diseases, Reflux esophagitis, inflammatory bowel diseases, Jaundice, & hepatitis, Cirrhosis, Diarrhoea and Constipation, Drug-induced liver disease					
UNIT - IV					
Bone and joint disorders: Rheumatoid arthritis, Osteoarthritis, Gout, Osteoporosis					
UNIT - V					
Dermatological Diseases: Psoriasis, Eczema and scabies, impetigo, drug induced skin disorders Ophthalmology: Conjunctivitis, Glaucoma					
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					



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COURSE STRUCTURE & SYLLABI

Course Code	CLINICAL PHARMACY PRACTICE	L	T	P	C
		21S09102	4	0	0
Semester		I			
Course Objectives:					
This course is designed to impart the basic knowledge and skills that are required to practice pharmacy including the provision of pharmaceutical care services to both healthcare professionals and patients in clinical settings					
Course Outcomes (CO): Student will 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					
UNIT - I					
Introduction to Clinical Pharmacy: Definition, evolution and scope of clinical pharmacy, International and national scenario of clinical MPP. 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)					
UNIT - II					
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 utilization evaluation, Documentation of clinical pharmacy services, Quality assurance of clinical pharmacy services.					
UNIT - III					
Patient Data Analysis: 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					
UNIT - IV					
Lab Data Interpretation: Tests associated with cardiac disorders, pulmonary function tests, Thyroid function tests, Fluid and electrolyte balance, Microbiological culture sensitivity tests					
UNIT - V					
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					
Reference Books:					
1. A Textbook of Clinical MPP – 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. Thomas J Johnson, Critical Care Pharmacotherapeutics					



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| <ol style="list-style-type: none">5. Collen D L, Sneha B S, Fundamental Skills for Patient Care in MPP6. Patient Assessment in Pharmacy, by Yolanda M H7. Relevant review articles from recent medical and pharmaceutical literature |
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COURSE STRUCTURE & SYLLABI

Course Code	HOSPITAL & COMMUNITY PHARMACY	L	T	P	C
		21S09103	4	0	0
Semester		I			
Course Objectives:					
This course is designed to impart basic knowledge and skills that are required to practice pharmacy in both hospital and community settings					
Course Outcomes (CO): Student will be able to					
Upon completion of this course it is expected that students shall be able to:					
<ul style="list-style-type: none"> • 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 					
UNIT - I					
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					
UNIT - II					
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					
UNIT - III					
Education and training: Training of technical staff, training and continuing education for pharmacists, Pharmacy students, Medical staff and students, Nursing staff and students, Formal and informal meetings and lectures, Drug and therapeutics newsletter. Community MPP: 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 software's & databases used in community pharmacies. Entrepreneurship in community pharmacy.					
UNIT - IV					
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 behaviour, strategies to improve medication adherence Patient referrals to the doctors ADR monitoring in community pharmacies					
UNIT - V					
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					



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COURSE STRUCTURE & SYLLABI

control programs Home Medicines review program – Definition, objectives, Guidelines, method and outcomes Research in community MPP

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 MPP – Ramesh Adepu, BSP Publishers, Hyderabad
5. Remington Pharmaceutical Sciences.
6. Relevant review articles from recent medical and pharmaceutical literature


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COURSE STRUCTURE & SYLLABI

Course Code	CLINICAL RESEARCH	L	T	P	C
21S09104		4	0	0	4
Semester		I			
Course Objectives:					
This course is designed to impart the basic knowledge and skills that are required in clinical research including drug development process especially the phases of clinical trials and also the ethical issues involved in the conduct of clinical research. Also, it aims to impart knowledge and develop skills on conceptualizing, designing, conducting and managing clinical trials					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> • 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 					
UNIT - I					
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, ICHGCP guidelines and ICMR guidelines in conduct of Clinical trials, Drug Safety Reporting					
UNIT - II					
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.					
UNIT - III					
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.					
UNIT - IV					
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					
UNIT - V					



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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.

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, Andrew. J. Flether Anthony W Fos, Peter DSloaier 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.



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Course Code	PHARMACOTHERAPEUTICS LAB - I	L	T	P	C
21S09105		0	0	6	3
Semester		I			
<p>The students are required to be posted to various clinical wards for their exposure with therapeutic management and other clinical aspects. They are expected to have experience and do a tutorial as well as case presentation in the following clinical conditions.</p> <p>The students have to make at least 10 case presentations covering most common diseases found in the hospital to which the college is attached. The student should also submit a record of the cases presented. The list of clinical cases presented should include follow-up of the clinical cases mentioned below from the day of admission till discharge and presented in the SOAP (Subjective, Objective, Assessment and Plan) format.</p> <p>1) The cases may be selected from the following Wards:</p> <ul style="list-style-type: none"> ❖ Gastroenterology ❖ Cardiology ❖ Pulmonology ❖ Orthopedics ❖ Endocrinology ❖ Dermatology <p>2) Rational use of medicines in special population admitted in above wards (three)</p> <p>3) Calculation of Bioavailability and Bioequivalence from the given data (two)</p> <p>4) Interpretation of Therapeutic Drug Monitoring reports of a given patient of any of the above wards (three)</p> <p>5) Calculation of various Pharmacoeconomic outcome analysis for the given data from the above (two) Assignments The students are required to submit a minimum of three written assignments (1500 to 2000 words) selected from the topics on different disease conditions given to them. The students are required to discuss both the clinical and therapeutic aspects in the same</p>					
Reference Books:					
<ol style="list-style-type: none"> 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 					



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Course Code	CLINICAL PHARMACY PRACTICE LAB	L	T	P	C
		21S09106	4	0	0
Semester		I			
List of Experiments:					
1. Treatment Chart Review (one) 2. Medication History Interview (one) 3. Patient Medication Counselling (two) 4. Drug Information Query (two) 5. Poison Information Query (one) 6. Lab Data Interpretation (two) 7. Presentation of clinical cases of various disease conditions adopting Pharmaceutical Care Plan Model (eight) 8. ABC Analysis of a given list of medications (one) 9. Preparation of content of a medicine, with proper justification, for the inclusion in the Hospital formulary (one) 10. Formulation and dispensing of a given IV admixtures (one) 11. Preparation of a patient information leaflet (two) 12. Preparation of Study Protocol (one) 13. Preparation of Informed Consent Form (one)					
Reference Books:					
1. Practice Standards and Definitions - The Society of Hospital Pharmacists of Australia 2. Thomas J Johnson, Critical Care Pharmacotherapeutics 3. Collen D L, Sneha B S, Fundamental Skills for Patient Care in MPP 4. Patient Assessment in Pharmacy, by Yolanda M H 5. Relevant review articles from recent medical and pharmaceutical literature					



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Course Code	PHARMACOTHERAPEUTICS - II	L	T	P	C
21S09201		4	0	0	4
Semester		II			
Course Objectives:					
This course aims to enable the students to understand the different treatment approaches in managing various disease conditions. Also, it imparts knowledge and skills in optimizing drug therapy of a patient by individualizing the treatment plan through evidence-based medicines					
Course Outcomes (CO): Student will 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)					
UNIT - I					
Nervous system: Epilepsy, Parkinson's disease, Stroke, Headache, Alzheimer's disease, Neuralgias and Pain pathways and Pain management					
UNIT - II					
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.					
UNIT - III					
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					
UNIT - IV					
Infectious diseases: Meningitis, HIV and opportunistic infections, Rheumatic fever, Dengue fever, H1N1, Helmenthiasis, Fungal infections. Gynecological disorders: Dysmenorrhea, Hormone replacement therapy.					
UNIT - V					
Oncology: General principles of cancer chemotherapy, pharmacotherapy of breast cancer, lung cancer, head & neck cancer, hematological malignancies, Management of nausea and vomiting, Palliative care					
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					



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COURSE STRUCTURE & SYLLABI

Course Code	CLINICAL PHARMACOKINETICS AND THERAPEUTIC DRUG MONITORING	L	T	P	C
21S09202		4	0	0	4
Semester		II			
Course Objectives:					
This course is designed to enable students to understand the basics principles and applications of pharmacokinetics in designing the individualized dosage regimen, to interpret the plasma drug concentration profile in altered pharmacokinetics, drug interactions and in therapeutic drug monitoring processes to optimize the drug dosage regimen. Also, it enables students to understand the basic concepts of pharmacogenetics, pharmacometrics for modeling and simulation of in kinetic data.					
Course Outcomes (CO): Student will 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 Pharmacodynamic of drugs Do pharmacokinetic modelling for the given data using the principles of pharmacometrics					
UNIT - I					
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					
UNIT - II					
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					
UNIT - III					
Non-Linear Mixed Effects Modelling: The Structural or Base Model, Modelling Random Effects, Modelling 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.					
UNIT - IV					
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.					
UNIT - V					



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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.

Reference Books:

1. Leon Shargel, Susanna Wu-Pong, Andrew Yu. Applied Biopharmaceutics & Pharmacokinetics. New York: McGraw 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. Ippincott 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. Prumer Concepts in Clinical Pharmacokinetics. American Society of Health-System Pharmacists, USA.
7. Malcolm Rowland, Thomas N. Tozer. Clinical Pharmacokinetics and pharmacodynamics: concepts and applications. Ippincott Williams & Wilkins, USA.
8. Evans, Schentag, Jusko. Applied pharmacokinetics. American Society of Health system Pharmacists, USA.
1. Michael E. Winter. Basic Clinical Pharmacokinetics. Ippincott Williams & Wilkins, USA.
2. 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



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COURSE STRUCTURE & SYLLABI

Course Code	PRINCIPLES OF QUALITY USE OF MEDICINES	L	T	P	C
		21S09203	4	0	0
Semester		II			
Course Objectives:					
This course is designed to impart basic knowledge and skills that are required to practice quality use of medicines (QUM) in different healthcare settings and also to promote quality use of medicines, in clinical practice, through evidence-based medicine approach.					
Course Outcomes (CO): Student will be able to					
Understand the principles of quality use of medicines Know the benefits and risks associated with use of medicines Understand regulatory aspects of quality use of medicines Identify and resolve medication related problems Promote quality use of medicines Practice evidence-based medicines					
UNIT - I					
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.					
UNIT - II					
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					
UNIT - III					
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.					
UNIT - IV					
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.					
UNIT - V					
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					
Reference Books:					
1. A Textbook of Clinical Pharmacy Practice– Essential concepts and skills– Parthasarathi G, Karin Nyfort-Hansen and Milap Nahata 2. Andrews E B, Moore N. Mann's Pharmacovigilance 3. Dipiro JT, Talbert RL, Yee GC. Pharmacotherapy: A Pathophysiologic Approach					



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4. Straus SE, Richardson WS, Glasziou P, Haynes RB. Evidence-Based Medicine: How to practice and teach it
5. Cohen M R. Medication Errors
6. Online:
 - 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
 - Relevant review articles from recent medical and pharmaceutical literature



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Course Code	PHARMACOEPIDEMIOLOGY & PHARMACOECONOMICS	L	T	P	C
21SOE301e			4	0	0
Semester		II			
Course Objectives:					
This course enables students to understand various pharmacoepidemiological methods and their clinical applications. Also, it aims to impart knowledge on basic concepts, assumptions, terminology, and methods associated with Pharmacoeconomics and health related outcomes, and when should be appropriate Pharmacoeconomic model should be applied for a health care regimen					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> • 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. 					
UNIT - I					
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.					
UNIT - II					
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.					
UNIT - III					
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.					
UNIT - IV					
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).					
UNIT - V					
Definition, Steps involved, Applications, Advantages and disadvantages of the following: Health related quality of life (HRQOL): Definition, Need for measurement of HRQOL, Common					



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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

Reference Books:

1. Rascati K L. Essentials of Pharmacoeconomics, Woulters Kluwe rLippincott 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 Modeling for Health Economic Evaluation, Oxford University Press, London.
4. K G Revikumar, Pharmacoepidemiology and Pharmacoeconomics Concepts and Practices.
5. Michael Drummond, Mark Sculpher, George Torrence, Bernie O'Brien and Greg Stoddart. Methods for the Economic Evaluation of Health Care Programs Oxford University Press, London.
6. George E Mackinnon III. Understanding health outcomes and Pharmacoeconomics.
7. Graker, Dennis. Pharmacoeconomics and outcomes.
8. Walley, Pharmacoeconomics.
9. Pharmacoeconomic – ed. by Nowakowska – University of Medical Sciences, Poznan.
10. Relevant review articles from recent medical and pharmaceutical literature
11. Guru Prasad Mohanta and P K Manna, Textbook of Pharmacovigilance Concepts and Practice



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Course Code	PHARMACOTHERAPEUTICS - II LAB	L	T	P	C
21S09204		0	0	6	3
Semester		II			
<p>The students are required to be posted to various clinical wards for their exposure with therapeutic management and other clinical aspects. They are expected to have experience and do a tutorial as well as case presentation in the following clinical conditions. The students have to make at least 10 case presentations covering most common diseases found in the hospital to which the college is attached. The student should also submit a record of the cases presented. The list of clinical cases presented should include follow-up of the clinical cases mentioned below from the day of admission till discharge and presented in the SOAP (Subjective, Objective, Assessment and Plan) format.</p> <p>I. The cases may be selected from the following diseases: 7. Neurology & Psychiatry 8. Oncology 9. Infectious Diseases & Immunology 10. Dermatology</p> <p>II. Rational use of medicines in special population admitted in above wards (three)</p> <p>III. Calculation of Bioavailability and Bioequivalence from the given data (two)</p> <p>IV. Interpretation of Therapeutic Drug Monitoring reports of a given patient of any of the above wards (three)</p> <p>V. Calculation of various Pharmacoeconomic outcome analysis for the given data from the above (two)</p> <p>ASSIGNMENTS: The students are required to submit a minimum of three written assignments (1500 to 2000 words) selected from the topics on different disease conditions given to them. The students are required to discuss both the clinical and therapeutic aspects in the same.</p>					
Reference Books:					
<ol style="list-style-type: none"> 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 					



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Course Code	CLINICAL PHARMACOKINETICS AND THERAPEUTIC DRUG MONITORING LAB	L	T	P	C
21S09205		0	0	6	3
Semester		II			
List of Experiments:					
<ol style="list-style-type: none"> 1. Causality assessment of adverse drug reactions (three) 2. Detection and management of medication errors (three) 3. Manufacture of parenteral formulations, powders. 4. Drug information queries. 5. Inventory control 6. Study of Design and Management of Hospital pharmacy department of a hospital. 7. Composition of Pharmacy and Therapeutics committee – Organization, functions, and limitations. 8. Development of a hospital formulary for a teaching hospital 9. Various sources of drug information and systematic approach to provide unbiased drug information. 10. Evaluation of prescriptions generated in hospital for drug interactions and find out the suitable management 					
Reference Books:					
<ol style="list-style-type: none"> 1. Leon Shargel, Susanna Wu-Pong, Andrew Yu. Applied Biopharmaceutics & Pharmacokinetics. New York: McGraw 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. Ippincott 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. Pruemmer Concepts in Clinical Pharmacokinetics. American Society of Health-System Pharmacists, USA. 7. Malcolm Rowland, Thomas N. Tozer. Clinical Pharmacokinetics and pharmacodynamics: concepts and applications. Ippincott Williams & Wilkins, USA. 					



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COURSE STRUCTURE & SYLLABI

Course Code	RESEARCH METHODOLOGY AND INTELLECTUAL PROPERTY RIGHTS	L	T	P	C
21DRM101		4	0	0	4
Semester		III			
Course Objectives:					
<ul style="list-style-type: none"> • To understand the research problem • To know the literature studies, plagiarism and ethics • To get the knowledge about technical writing • To analyze the nature of intellectual property rights and new developments • To know the patent rights 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> • Understand research problem formulation. • Analyze research related information • Follow research ethics • Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity. • Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasize the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular. <p>Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits</p>					
UNIT - I					
Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations					
UNIT - II					
Effective literature studies approaches, analysis, Plagiarism, Research ethics					
UNIT - III					
Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee					
UNIT - IV					
Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.					
UNIT - V					
Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.					
Textbooks:					
1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students"					



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2. Wayne Goddard and Stuart Melville, “Research Methodology: An Introduction”
Reference Books:
1. Ranjit Kumar, 2nd Edition, “Research Methodology: A Step by Step Guide for beginners”
2. Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd ,2007.
3. Mayall, “Industrial Design”, McGraw Hill, 1992.
4. Niebel, “Product Design”, McGraw Hill, 1974.
5. Asimov, “Introduction to Design”, Prentice Hall, 1962.
6. Robert P. Merges, Peter S. Menell, Mark A. Lemley, “Intellectual Property in New
7. Technological Age”, 2016.
8. T. Ramappa, “Intellectual Property Rights Under WTO”, S. Chand, 2008



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AUDIT COURSE-I



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COURSE STRUCTURE & SYLLABI

Course Code	ENGLISH FOR RESEARCH PAPER WRITING	L	T	P	C
21DAC101a		2	0	0	0
Semester		I			
Course Objectives: This course will enable students:					
<ul style="list-style-type: none"> • Understand the essentials of writing skills and their level of readability • Learn about what to write in each section • Ensure qualitative presentation with linguistic accuracy 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> • Understand the significance of writing skills and the level of readability • Analyze and write title, abstract, different sections in research paper • Develop the skills needed while writing a research paper 					
UNIT - I		Lecture Hrs:10			
1 Overview of a Research Paper- Planning and Preparation- Word Order- Useful Phrases - Breaking up Long Sentences-Structuring Paragraphs and Sentences-Being Concise and Removing Redundancy -Avoiding Ambiguity					
UNIT - II		Lecture Hrs:10			
Essential Components of a Research Paper- Abstracts- Building Hypothesis-Research Problem - Highlight Findings- Hedging and Criticizing, Paraphrasing and Plagiarism, Cauterization					
UNIT - III		Lecture Hrs:10			
Introducing Review of the Literature – Methodology - Analysis of the Data-Findings - Discussion- Conclusions-Recommendations.					
UNIT - IV		Lecture Hrs:9			
Key skills needed for writing a Title, Abstract, and Introduction					
UNIT - V		Lecture Hrs:9			
Appropriate language to formulate Methodology, incorporate Results, put forth Arguments and draw Conclusions					
Suggested Reading					
<ol style="list-style-type: none"> 1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books) Model Curriculum of Engineering & Technology PG Courses [Volume-I] 2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press 3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook 4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011 					



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COURSE STRUCTURE & SYLLABI

Course Code	DISASTER MANAGEMENT	L	T	P	C
21DAC101b			2	0	0
Semester		I			
Course Objectives: This course will enable students:					
<ul style="list-style-type: none"> • Learn to demonstrate critical understanding of key concepts in disaster risk reduction and humanitarian response. • Critically evaluatedisasterriskreduction and humanitarian response policy and practice from Multiple perspectives. • Developanunderstandingofstandards ofhumanitarianresponseandpracticalrelevanceinspecific types of disasters and conflict situations • Criticallyunderstandthestrengthsandweaknessesofdisastermanagementapproaches,planningand programming in different countries, particularly their home country or the countries they work in 					
UNIT - I					
<p>Introduction: Disaster:Definition,FactorsandSignificance;DifferenceBetweenHazardandDisaster;Naturaland Manmade Disasters: Difference, Nature, Types and Magnitude.</p> <p>Disaster Prone Areas in India: Study of Seismic Zones; Areas Prone to Floods and Droughts, Landslides and Avalanches; Areas Prone to Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post- Disaster Diseases and Epidemics</p>					
UNIT - II					
<p>Repercussions of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes,Volcanisms,Cyclones,Tsunamis,Floods,DroughtsandFamines,Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.</p>					
UNIT - III					
<p>Disaster Preparedness and Management: Preparedness: Monitoring of Phenomena Triggering ADisasteror Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological and Other Agencies, Media Reports: Governmental and Community Preparedness.</p>					
UNIT - IV					
<p>Risk Assessment Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. TechniquesofRiskAssessment,GlobalCo-OperationinRiskAssessmentand Warning, People’s Participation in Risk Assessment. Strategies for Survival.</p>					
UNIT - V					
<p>Disaster Mitigation: Meaning,ConceptandStrategiesofDisasterMitigation,EmergingTrendsInMitigation.Structural Mitigationand Non-Structural Mitigation, Programs of Disaster Mitigation in India.</p>					
Suggested Reading					



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1. R.Nishith,SinghAK,“DisasterManagementinIndia:Perspectives,issuesandstrategies
2. “New Royal book
Company..Sahni,PardeepEt.Al.(Eds.),”DisasterMitigationExperiencesAndReflections”,PrenticeHall OfIndia, New Delhi.
3. GoelS.L.,DisasterAdministrationAndManagementTextAndCaseStudies”,Deep&Deep
Publication Pvt. Ltd., New Delhi



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COURSE STRUCTURE & SYLLABI

Course Code	SANSKRITFOR TECHNICAL KNOWLEDGE	L	T	P	C
21DAC101c		2	0	0	0
Semester		I			
Course Objectives: This course will enable students:					
<ul style="list-style-type: none"> • To get a working knowledge in illustrious Sanskrit, the scientific language in the world • Learning of Sanskrit to improve brain functioning • Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power • The engineering scholars equipped with Sanskrit will be able to explore the huge • Knowledge from ancient literature 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> • Understanding basic Sanskrit language • Ancient Sanskrit literature about science & technology can be understood • Being a logical language will help to develop logic in students 					
UNIT - I					
Alphabets in Sanskrit,					
UNIT - II					
Past/Present/Future Tense, Simple Sentences					
UNIT - III					
Order, Introduction of roots					
UNIT - IV					
Technical information about Sanskrit Literature					
UNIT - V					
Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics					
Suggested Reading					
<ol style="list-style-type: none"> 1. "Abhyaspustakam" – Dr. Vishwas, Sanskrit-Bharti Publication, New Delhi 2. "Teach Yourself Sanskrit" Prathama Deeksha- Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication 3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi 					



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AUDIT COURSE-II



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COURSE STRUCTURE & SYLLABI

Course Code	PEDAGOGY STUDIES	L	T	P	C
21DAC201a			2	0	0
Semester		II			
Course Objectives: This course will enable students:					
<ul style="list-style-type: none"> • Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers. • Identify critical evidence gaps to guide the development. 					
Course Outcomes (CO): Student will be able to					
Students will be able to understand: <ul style="list-style-type: none"> • What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries? • What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners? • How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? 					
UNIT - I					
Introduction and Methodology: Aims and rationale, Policy back ground, Conceptual frame work and terminology Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.					
UNIT - II					
Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.					
UNIT - III					
Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.					
UNIT - IV					
Professional development: alignment with classroom practices and follow-up support, Peer support, Support from the head teacher and the community. Curriculum and assessment, Barrier to learning: limited resources and large class sizes					
UNIT - V					
Research gaps and future directions: Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.					
Suggested Reading					
<ol style="list-style-type: none"> 1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261. 2. Agrawal M (2004) Curricular reforms in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379. 3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID. 					



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5. Akyeampong K, LussierK, PryorJ, Westbrook J (2013)Improving teaching and learning of basic maths and reading in Africa: Does teacherpreparation count?International Journal Educational Development, 33 (3): 272–282.
6. Alexander RJ(2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
Chavan M (2003)ReadIndia: A mass scale, rapid, ‘learning to read’campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.



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COURSE STRUCTURE & SYLLABI

Course Code	STRESSMANAGEMENT BY YOGA	L	T	P	C
21DAC201b			2	0	0
Semester		II			
Course Objectives: This course will enable students:					
<ul style="list-style-type: none"> • To achieve overall health of body and mind • To overcome stres 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> • Develop healthy mind in a healthy body thus improving social health also • Improve efficiency 					
UNIT - I					
Definitions of Eight parts of yog.(Ashtanga)					
UNIT - II					
Yam and Niyam.					
UNIT - III					
Do`sand Don`t`sin life.					
i) Ahinsa,satya,astheya,bramhacharyaand aparigrahaaii)					
Shaucha,santosh,tapa,swadhyay,ishwarpranidhan					
UNIT - IV					
Asan and Pranayam					
UNIT - V					
i)Variousyogposesand theirbenefitsformind &body					
ii)Regularizationofbreathingtechniques and its effects-Types ofpranayam					
Suggested Reading					
1.‘Yogic Asanas forGroupTarining-Part-I’: Janardan SwamiYogabhyasiMandal, Nagpur					
2.‘Rajayogaor conquering the Internal Nature’ by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata					



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Course Code	PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS	L	T	P	C
21DAC201c		2	0	0	0
Semester		II			
Course Objectives: This course will enable students:					
<ul style="list-style-type: none"> • To learn to achieve the highest goal happily • To become a person with stable mind, pleasing personality and determination • To awaken wisdom in students 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> • Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life • The person who has studied Geeta will lead the nation and mankind to peace and prosperity • Study of Neetishatakam will help in developing versatile personality of students 					
UNIT - I					
Neetisatakam- Holistic development of personality Verses-19,20,21,22(wisdom) Verses-29,31,32(pride & heroism) Verses-26,28,63,65(virtue)					
UNIT - II					
Neetisatakam- Holistic development of personality Verses-52,53,59(dont's) Verses-71,73,75,78(do's)					
UNIT - III					
Approach to day to day work and duties. Shrimad Bhagwad Geeta: Chapter 2- Verses 41, 47, 48, Chapter 3- Verses 13, 21, 27, 35, Chapter 6- Verses 5, 13, 17, 23, 35, Chapter 18- Verses 45, 46, 48.					
UNIT - IV					
Statements of basic knowledge. Shrimad Bhagwad Geeta: Chapter 2- Verses 56, 62, 68 Chapter 12 - Verses 13, 14, 15, 16, 17, 18 Personality of Role model. Shrimad Bhagwad Geeta:					
UNIT - V					
Chapter 2- Verses 17, Chapter 3- Verses 36, 37, 42, Chapter 4- Verses 18, 38, 39 Chapter 18- Verses 37, 38, 63					
Suggested Reading					
1. "Srimad Bhagavad Gita" by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata 2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P. Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.					



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M.PHARM. IN PHARMACY PRACTICE

COURSE STRUCTURE & SYLLABI

OPEN ELECTIVE



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M.PHARM. IN PHARMACY PRACTICE

COURSE STRUCTURE & SYLLABI

Course Code	PHARMACEUTICAL VALIDATION (Elective)	L	T	P	C
2ISOE301a		3	0	0	3
Semester		III			
Course Objectives:					
The main purpose of the subject is to understand about validation and how it can be applied to industry and thus to improve the quality of the products. The subject covers the complete information about validation, types, methodology and application					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> • Explain the aspect of validation • Carryout validation of manufacturing processes • Apply the knowledge of validation to instruments and equipments • Validate the manufacturing facilities 					
UNIT - I					
Introduction: Definition of Qualification and Validation, Advantage of Validation, Streamlining of Qualification & Validation process and Validation Master Plan. Qualification: User Requirement Specification, Design Qualification, Factory Acceptance Test (FAT)/ Site Acceptance Test (SAT), Installation Qualification, Operational Qualification, Performance Qualification, Re- Qualification (Maintaining status -Calibration Preventive Maintenance, Change management), Qualification of Manufacturing Equipment, Qualification of Analytical Instruments and Laboratory equipments					
UNIT - II					
Qualification of analytical instruments: Electronic balance, pH meter, UV-Visible spectrophotometer, FTIR, GC, HPLC, HPTLC Qualification of Glassware: Volumetric flask, pipette, Measuring cylinder, beakers and burette.					
UNIT - III					
Qualification of laboratory equipments: Hardness tester, Friability test apparatus, tap density tester, Disintegration tester, Dissolution test apparatus. Validation of Utility systems: Pharmaceutical water system & pure steam, HVAC system, Compressed air and nitrogen.					
UNIT - IV					
Cleaning Validation: Cleaning Validation - Cleaning Method development, Validation and validation of analytical method used in cleaning. Cleaning of Equipment. Cleaning of Facilities. Cleaning in place (CIP).					
UNIT - V					
Analytical method validation: General principles, Validation of analytical method as per ICH guidelines and USP					
Textbooks:					
<ol style="list-style-type: none"> 1. T. Loftus & R. A. Nash, "Pharmaceutical Process Validation", Drugs and Pharm Sci. Series, Vol.129, 3rd Ed., Marcel Dekker Inc., N.Y. 2. The Theory & Practice of Industrial Pharmacy, 3rd edition, Leon Lachman, Herbert A. Lieberman, Joseph. L. Karig, Varghese Publishing House, Bombay. 3. Validation Master plan by Terveeks or Deeks, Davis Harwood International publishing. 4. Validation of Aseptic Pharmaceutical Processes, 2nd Edition, by Carleton & Agalloco, (Marcel Dekker). 5. Michael Levin, Pharmaceutical Process Scale-Up, Drugs and Pharm. Sci. Series, Vol. 157, 2nd Ed., Marcel Dekker Inc., N.Y. 					



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M.PHARM. IN PHARMACY PRACTICE

COURSE STRUCTURE & SYLLABI

Course Code	BIOSTATISTICS (Elective)	L	T	P	C
		21SOE301b	3	0	0
Semester		III			
Course Objectives:					
The student shall know the introduction, scope of biostatistics and Research work, calculation and present of the data					
Course Outcomes (CO): Student will be able to					
The student will be known the Biostatistics arrangement, presentation and formation of tables and charts. They also know the correlation and regression & application of different methods, analysis of data					
UNIT - I		12Hrs			
An introduction to statistics and biostatistics-collection and organization of data, graphical, pictorial presentation of data, measures of central tendency and dispersion, sampling techniques, sample size, Coefficient of variation, mean error, relative error, precision and accuracy					
UNIT - II		12Hrs			
Tests of significance: Testing hypotheses – Principles and applications of Z, t, F-ratio and chi-square tests in pharmaceutical and medical research. Non-parametric tests: sign test, Wilcoxon signed rank test, Wilcoxon rank sum test, Kruskal Wallis test, run test and median tests					
UNIT - III		12Hrs			
Design of Experiments: Principles of randomization, replication and local control; CRD, RBD, LSD – their applications and analysis of data;					
UNIT - IV		12Hrs			
Factorial Experiments – Principles and applications; Probit analysis: Dose – effect relationships, calculation of LD50, ED50.					
UNIT - V		12Hrs			
Statistical quality control: Meaning and uses, Construction of X, R, P, np and charts					
Textbooks:					
<ol style="list-style-type: none"> 1. Remington's Pharmaceutical Sciences 2. Theory & Practice of Industrial Pharmacy by Lachman 3. Statistics for business and economics 3rd edition by Vikas books publications 4. Biostatistics & Computer applications by GN Rao and NK Tiwari 5. Sokal, R.R. and Rohlf, F.J. 1987. An Introduction to Biostatistics. W.H. Freeman and Company. 6. Bailey, N.T.J. 1981. Statistical Methods in Biology. English University Press. 7. Mitchell, K. and Glover, T. 2001. Introduction to Biostatistics. McGraw Hill, Publishing Co. 					
Reference Books:					
<ol style="list-style-type: none"> 1. Statistics for business and economics 3rd edition by Vikas books publications 2. Biostatistics & Computer applications by GN Rao and NK Tiwari 3. Sokal, R.R. and Rohlf, F.J. 1987. An Introduction to Biostatistics. W.H. Freeman and Company. 4. Bailey, N.T.J. 1981. Statistical Methods in Biology. English University Press. 5. Mitchell, K. and Glover, T. 2001. Introduction to Biostatistics. McGraw Hill, Publishing Co. 					



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COURSE STRUCTURE & SYLLABI

Course Code	ENTREPRENEURSHIP MANAGEMENT (Elective)	L	T	P	C
		21SOE301c	3	0	0
Semester		III			
Course Objectives:					
This course is designed to impart knowledge and skills necessary to train the students on entrepreneurship management.					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> • The Role of enterprise in national and global economy • Dynamics of motivation and concepts of entrepreneurship • Demands and challenges of Growth Strategies and Networking 					
UNIT - I					
Conceptual Frame Work: Concept need and process in entrepreneurship development. Role of enterprise in national and global economy. Types of enterprise – Merits and Demerits. Government policies and schemes for enterprise development. Institutional support in enterprise development and management.					
UNIT - II					
Entrepreneur: Entrepreneurial motivation – dynamics of motivation. Entrepreneurial competency – Concepts. Developing Entrepreneurial competencies - requirements and understanding the process of entrepreneurship development, self-awareness, interpersonal skills, creativity, assertiveness, achievement, factors affecting entrepreneur role.					
UNIT - III					
Launching and Organizing an Enterprise: Environment scanning – Information, sources, schemes of assistance, problems. Enterprise selection, market assessment, enterprise feasibility study, SWOT Analysis. Resource mobilization -finance, technology, raw material, site and manpower. Costing and marketing management and quality control. Feedback, monitoring and evaluation.					
UNIT - IV					
Growth Strategies and Networking: Performance appraisal and assessment. Profitability and control measures, demands and challenges. Need for diversification. Future Growth – Techniques of expansion and diversification, vision strategies. Concept and dynamics. Methods, Joint venture, coordination and feasibility study.					
UNIT - V					
Preparing Project Proposal to Start on New Enterprise Project work – Feasibility report; Planning, resource mobilization and implementation.					
Reference Books:					
<ol style="list-style-type: none"> 1. Akhauri, M. M. P.(1990): Entrepreneurship for Women in India, NIESBUD, New Delhi. 2. Hisrich, R. D & Brush, C.G. (1996) The Women Entrepreneurs, D.C. Health& Co., Toronto. 3. Hisrich, R.D. and Peters, M.P. (1995): Entrepreneurship – Starting Developing and Managing a New Enterprise, Richard D., Inwin, INC, USA. 4. Meredith, G.G. etal (1982): Practice of Entrepreneurship, ILO, Geneva. 5. Patel, V.C. (1987): Women Entrepreneurship – Developing New Entrepreneurs, Ahmedabad EDII 6. Arya kumar.(2012): Entrepreneurship- Creating and Leading an Entrepreneurial Organization, Pearson 					