

# Gujarat Technological University

## M. Pharm. Semester – II

Structure for Second Semester of Master of Pharmacy Course

Sr. _o.	Subject	Teaching Scheme		Marking Scheme			
		Credits		Theory		Practical	
		Theory	Practical	Ext	Intl	Ext	Intl
1.	Research Methodology	07	-	80	20	--	--
2.	Subject Specialization of Paper – III	07	08	80	20	80	20
3.	Subject Specialization of Paper – IV	08	--	80	20	--	--
	<b>Total</b>	<b>22</b>	<b>08</b>				

# Gujarat Technological University

## Master of Pharmacy

### Semester – II

Paper code -2920001

## Research Methodology

(Common to all discipline)

### Theory

(Four hours per week, 7 credits)

1. Research-Meaning, purpose, Types, (Educational, Clinical, Experimental, Historical descriptive, Basic applied and Patent oriented Research) objective of Research
2. Literature survey-Use of Library, books and journals-Medlines-Internet, Patent Search, and reprints of articles as a source for Literature survey.
3. Selecting a problem and preparing Research proposals
4. Methods and tools use in research –
  - A. Qualities studies, quantitative studies
  - B. Simple data organization descriptive data analysis,
  - C. Limitation & sources of Error
  - D. Inquiries in form of Questionnaire, etc.
5. Documentation-
  - A. "How" of documentation
  - B. Techniques of documentation
  - C. Importance of documentation
  - D. Use of computer packages in documentation.
6. The Research Report Paper writing/ thesis writing  
Different parts of the Research paper
  1. Title –Title of project with authors name
  2. Abstract- Statement of the problem, Background list in brief and Purpose and scope.
  3. Key Words.
  4. Methodology-subject, apparatus, instrumentation & procedure.
  5. Results- tables, graphs, figures & statistical presentation
  6. Discussion support or non support of hypothesis, practical & theoretical Implications
  7. Conclusion
  8. Acknowledgements.
  9. References
  10. Errata
  11. Importance of Spell check for entire project
  12. Uses of footnotes
7. Presentation (especially for oral presentation)  
Importance, types different skills, contained, format of model, introduction, Poster, Gestures, eye contact, facial, expressions, stage, fright, volume- pitch, speed, pause & language, Visual aids & seating, Questionnaire
8. Cost analysis of the project – cost incurred on raw materials-  
Procedure, instrumentations and clinical trials.
9. Sources for procurement research grants – international agencies, Government and private bodies.
10. Industrial-institution interaction- Industrial projects, their, feasibility reports.  
Interaction with industries.

## References Books:

1. Research in Education- John V. Best, John V. Kahn 7<sup>th</sup> edition
2. Presentation skills - Michael Hallon- Indian Society for Institute education
2. Practical Introduction o copyright. - Gavin Mcfarlane
3. Thesis projects in Science & Engineering – Richard M. Davis.
4. Scientist in legal Systems- Ann labor science
5. Thesis & Assignment – Jonathan Anderson
6. Writing a technical paper- Donald Menzel
7. Effective Business Report Writing –Leland Brown
8. Protection of industrial Property rights- P. Das & Gokul Das
9. Spelling for the millions- Edna Furrness
10. Preparation for publication – King Edward Hospital Fund for London
11. Information Technology – The Hindu speaks
12. Documentation – Genesis & Development 3792.
13. Manual for evaluation of industrial projects-United Nations
14. Manual for the preparation of industrial feasibility studies

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## Master of Pharmacy

Semester – II

Paper code -2920101

Specialization paper - III

### Advance Organic Chemistry- II

Theory

(Six hours per week, 7 credits)

1. Detailed study of individual reactions - allylic rearrangement, Aldol condensation, Alder ester synthesis- Bayer-Villiger rearrangement, benzilic acid rearrangement – Curtius rearrangement- Dimorth rearrangement, Heck reaction, Lossen –Schmidt rearrangement, Pinner reaction, Reformatsky reaction, Sharpless oxidation, Suzuki reaction, Sonogashira reaction, Swern oxidation, Vilsmeier Haack reaction.
2. Stereochemistry and Chiral Techniques.
  - a. Principles of stereochemistry including geometric isomerism, optical isomerism and conformational isomerism.
  - b. Stereochemistry of compounds with asymmetric plane.
  - c. Concept of chiral drugs, resolution of racemic mixtures, racemic switches, asymmetric synthesis of following drugs: pVitamin C, pNifedipine, pAtenolol, Ethambutol, Omeprazole, Ampicillin and Thalidomide.
  - d. Role of stereochemistry in pharmacokinetics and pharmacodynamics
3. Synthon Approach:  
Definition, terms and abbreviation, rules and guidelines used in synthesis of following drugs.  
Pyrimethamine, pIbuprofen, pDiclofenac, pRosiglitazone, pCetirizine, pCiprofloxacin, Captopril, and Losartan
4. Green Chemistry:: Solvent free reaction, water as a solvent, ionic liquids, supercritical liquids, supported reagents and catalyst.
5. Introduction to microwave reactions, ultrasound reactions, nanochemistry

Specialization paper - III

### Advance Organic Chemistry- II

Practical

(Six hours per week, 8 credits)

Laboratory examination including practical examination in general course illustrative of theory section in the syllabus.

#### Reference Books:

1. March Jerry– Advance Organic Chemistry - Reaction Mechanism and Structure, McGraw-Hill International Book Company
2. F. A. Carey and R. J. Sundberg – Advance Organic Chemistry Part – A & B, Plenum Press.
3. Clayden Greeves and others – Organic Chemistry, Oxford University Press.
4. Jie Jack Li - Name Reactions, Springer
5. Eliel – Stereochemistry of Carbon Compounds
6. S. Warren - Designing Organic Synthesis, Wiley India Ltd.
7. P. T. Anastas and J. C. Warner – Green Chemistry theory and Practice, Oxford University Press.
8. C. Oliver Kauffmann and others – Practical Microwave Synthesis for Organic Chemist, Wiley Interscience.
9. G. B. Sergeev – Nanochemistry, Elsevier publication\

# Gujarat Technological University

## Master of Pharmacy

### Semester – II

Paper code -2920201

Specialization paper - IV

## Drug Design and Discovery

### Theory

(Six hours per week, 8 credits)

1. General Introduction to drug discovery concept/process and importance of drug design approaches in drug discovery.
2. Various targets for drug action and theory of drug action –agonist, antagonism/blockers and enzyme inhibition (IC50, EC50 concept)- an overview
3. A general study of stereochemistry and physicochemical properties of the drug/drug-like molecules and their importance in drug action. Correlation between physicochemical properties and drug action, establishing structure activity relationship (SAR) and its analysis. Isosterism and bio-isosterism as guides to structural variations and Prodrug design its application in lead optimization.
4. Various approaches to drug discovery
5. Quantitative Structure Activity Relationship QSAR- brief introduction to various methods of QSAR – Physicochemical parameters – lipophilic, electronic and steric. Detail study on Hansch LFER model, Free Wilson analysis and mixed approach. Various basic statistical methods useful in QSAR development.
  - a. 3D QSAR – importance and various models (COMFA, MSA, HASL, Apex 3D, DISCO, GFA) used for it.
6. Computer Aided Drug Design (CADD) – Molecular modeling
  - a. Basic concepts of computational chemistry like Quantum Mechanics, Molecular Mechanics, Force Field, Energy minimization, Conformational generation and analysis, geometry optimization, Molecular Dynamics
  - b. Ligand based drug design, Analogue approach, Pharmacophore Mapping, importance of ligand shape and Excluded volume techniques, Artificial intelligence methods.
  - c. Structure based drug design, requirement of SBDD, utilization of target structure derived from NMR and X-ray Crystallography techniques, understanding of drug–receptor/enzyme/target interactions, preparation of protein/target along with active site analysis, docking process, various docking methods. De-novo drug design.
  - d. Drug design based on antagonism and enzyme inhibition. Various software used in CADD
7. Virtual screening of huge compound databases by using Pharmacophore mapping as well as docking methods
8. Pharmacokinetics (Absorption, Distribution, Metabolism Elimination i.e. ADME) in drug discovery.

### References Books:

1. Ariens – Drug Design, vol. VII, Academic Press.
2. H Smith & H J William – Introduction to the Principles of Drug Design, John Wright & Sons Ltd.
3. Burgers Medicinal Chemistry – The Basis of Medicinal Chemistry by Manfred S.

4. Computer assisted Drug Design by Edward C. Olson (America Chemical Society, ACD symposium series 112).
5. W. O. Foye - Principles of Medicinal Chemistry, Lipincott Williams and Wilkins.
6. C. Hansch and Leo - Comprehensive Medicinal Chemistry Vol. 4, Pergamon Press.
7. Molecular Modeling in Drug Design by Cohen N. C.
8. C. G. Wermuth - The Practice of Medicinal Chemistry, Elsevier publication.
9. E. H. Kerns and L. Di - Drug like properties, concepts, structure design and methods, Academic Press.