Gandhinagar Institute of Pharmacy
Bachelor of Pharmacy (Undergraduate)
Semester 4

SCHEME OF TEACHING

Course Code	Name of the Course	No. of Hours	Tutorial	Credit Points
BP401T	Pharmaceutical Organic Chemistry-III (Theory)	3	1	4
BP402T	Medicinal Chemistry-I (Theory)	3	1	4
BP403T	Physical Pharmaceutics-II (Theory)	3	1	4
BP404T	Pharmacology-I (Theory)	3	1	4
BP405T	Pharmacognosy & Phytochemistry-I (Theory)	3	1	4
BP406T	Communication Skills (Theory)	2	-	2
BP402P	Medicinal Chemistry-I (Practical)	4	-	2
BP403P	Physical Pharmaceutics-II (Practical)	4	-	2
BP404P	Pharmacology-I (Practical)	4	-	2
BP405P	Pharmacognosy & Phytochemistry-I (Practical)	4	-	2
BP406P	Communication Skills (Practical)	2	-	1
	Total	**35**	**5**	**31**

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SCHEME OF EVALUATION

Course Code	Name of the Course	Marks Distribution			
		University (End Semester Exam)	Institute		Total
			Sessional Exams	Continuous Mode	
BP401T	Pharmaceutical Organic Chemistry-III (Theory)	75	15	10	100
BP402T	Medicinal Chemistry-I (Theory)	75	15	10	100
BP403T	Physical Pharmaceutics-II (Theory)	75	15	10	100
BP404T	Pharmacology-I (Theory)	75	15	10	100
BP405T	Pharmacognosy & Phytochemistry-I (Theory)	75	15	10	100
BP406T	Communication Skills (Theory)	35	10	5	50
BP402P	Medicinal Chemistry-I (Practical)	35	10	5	50
BP403P	Physical Pharmaceutics-II (Practical)	35	10	5	50
BP404P	Pharmacology-I (Practical)	35	10	5	50
BP405P	Pharmacognosy & Phytochemistry-I (Practical)	35	10	5	50
BP406P	Communication Skills (Practical)	15	5	5	25
Total		**565**	**130**	**80**	**775**

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Subject Code: BP401T	Subject Title: Pharmaceutical Organic Chemistry-III (Theory)
Pre-requisite: --	

Scope: This subject imparts knowledge on stereo-chemical aspects of organic compounds and organic reactions, important named reactions, chemistry of important hetero cyclic compounds. It also emphasizes on medicinal and other uses of organic compounds.

Course Objectives: Upon completion of this course the student shall be able to

1. Understand the methods of preparation and properties of organic compounds.
2. Explain the stereo chemical aspects of organic compounds and stereo chemical reactions.
3. Know the medicinal uses and other applications of organic compounds.

Teaching Scheme (Hours per week)			Evaluation Scheme (Marks)			
			Theory			Total
Lecture	Tutorial	Credit	University Assessment	Continuous Assessment	Internal Assessment	
3	1	4	75	10	15	100

Detailed Syllabus:

Note: To emphasize on definition, types, mechanisms, examples, uses/applications.

Sr. No.	Unit	Hours	Weightage (%)
1	**Stereo isomerism** Optical isomerism – Optical activity, enantiomerism, diastereoisomerism, meso compounds Elements of symmetry, chiral and achiral molecules DL system of nomenclature of optical isomers, sequence rules, RS system of nomenclature of optical isomers Reactions of chiral molecules Racemic modification and resolution of racemic mixture. Asymmetric synthesis: partial and absolute	10 Hours	22.22%
2	Geometrical isomerism Nomenclature of geometrical isomers (Cis Trans, EZ, Syn Anti systems) Methods of determination of configuration of geometrical isomers. Conformational isomerism in Ethane, n-Butane and Cyclohexane.	10 Hours	22.22%

Sr. No.	Unit	Hours	Weightage (%)
	Stereo isomerism in biphenyl compounds (Atropisomerism) and conditions for optical activity. Stereospecific and stereoselective reactions		
3	**Heterocyclic compounds:** Nomenclature and classification Synthesis, reactions and medicinal uses of following compounds/derivatives Pyrrole, Furan, and Thiophene Relative aromaticity and reactivity of Pyrrole, Furan and Thiophene	10 Hours	22.22%
4	Synthesis, reactions and medicinal uses of following compounds/derivatives Pyrazole, Imidazole, Oxazole and Thiazole. Pyridine, Quinoline, Isoquinoline, Acridine and Indole. Basicity of pyridine Synthesis and medicinal uses of Pyrimidine, Purine, azepines and their derivatives	08 Hours	17.78%
5	**Reactions of synthetic importance** Metal hydride reduction ($NaBH_4$ and $LiAlH_4$), Clemmensen reduction, Birch reduction, Wolff Kishner reduction. Oppenauer-oxidation and Dakin reaction. Beckmanns rearrangement and Schmidt rearrangement. Claisen-Schmidt condensation	07 Hours	15.55%

Recommended Books (Latest Editions)

1. Organic chemistry by I.L. Finar, Volume-I & II.
2. A text book of organic chemistry – Arun Bahl, B.S. Bahl.
3. Heterocyclic Chemistry by Raj K. Bansal
4. Organic Chemistry by Morrison and Boyd
5. Heterocyclic Chemistry by T.L. Gilchrist

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Subject Code: BP402T	Subject Title: Medicinal Chemistry – I (Theory)
Pre-requisite: --	

Scope: This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on chemical synthesis of important drugs under each class.

Course Objectives: Upon completion of this course the student shall be able to

1. Understand the chemistry of drugs with respect to their pharmacological activity
2. Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
3. Know the Structural Activity Relationship (SAR) of different class of drugs
4. Write the chemical synthesis of some drugs

Teaching Scheme (Hours per week)			Evaluation Scheme (Marks)			
			Theory			Total
Lecture	Tutorial	Credit	University Assessment	Continuous Assessment	Internal Assessment	
3	1	4	75	10	15	100

Detailed Syllabus:

Study of the development of the following classes of drugs, Classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs as specified in the course and synthesis of drugs superscripted (*)

Sr. No.	Unit	Hours	Weightage (%)
1	**Introduction to Medicinal Chemistry** **History and development of medicinal chemistry** **Physicochemical properties in relation to biological action** Ionization, Solubility, Partition Coefficient, Hydrogen bonding, Protein binding, Chelation, Bioisosterism, Optical and Geometrical isomerism. **Drug metabolism** Drug metabolism principles- Phase I and Phase II. Factors affecting drug metabolism including stereo chemical aspects.	10 Hours	22.22%
2	**Drugs acting on Autonomic Nervous System** **Adrenergic Neurotransmitters:**	10 Hours	22.22%

Sr. No.	Unit	Hours	Weightage (%)
	Biosynthesis and catabolism of catecholamine, Adrenergic receptors (Alpha & Beta) and their distribution. **Sympathomimetic agents: SAR of Sympathomimetic agents** Direct acting: Nor-epinephrine, Epinephrine, Phenylephrine*, Dopamine, Methyldopa, Clonidine, Dobutamine, Isoproterenol, Terbutaline, Salbutamol*, Bitolterol, Naphazoline, Oxymetazoline and Xylometazoline. • Indirect acting agents: Hydroxyamphetamine, Pseudoephedrine, Propylhexedrine. • Agents with mixed mechanism: Ephedrine, Metaraminol. **Adrenergic Antagonists:** **Alpha adrenergic blockers:** Tolazoline*, Phentolamine, Phenoxybenzamine, Prazosin, Dihydroergotamine, Methysergide. **Beta adrenergic blockers:** SAR of beta blockers, Propranolol*, Metibranolol, Atenolol, Betazolol, Bisoprolol, Esmolol, Metoprolol, Labetolol, Carvedilol.		
3	**Cholinergic neurotransmitters:** Biosynthesis and catabolism of acetylcholine. Cholinergic receptors (Muscarinic & Nicotinic) and their distribution. **Parasympathomimetic agents: SAR of Parasympathomimetic agents** **Direct acting agents:** Acetylcholine, Carbachol*, Bethanechol, Methacholine, Pilocarpine. **Indirect acting/ Cholinesterase inhibitors (Reversible & Irreversible):** Physostigmine, Neostigmine*, Pyridostigmine, Edrophonium chloride, Tacrine hydrochloride, Ambenonium chloride, Isofluorphate, Echothiophate iodide, Parathione, Malathion. **Cholinesterase reactivator:** Pralidoxime chloride. **Cholinergic Blocking agents:** SAR of cholinolytic agents **Solanaceous alkaloids and analogues:** Atropine sulphate, Hyoscyamine sulphate, Scopolamine	10 Hours	22.22%

Sr. No.	Unit	Hours	Weightage (%)
	hydrobromide, Homatropine hydrobromide, Ipratropium bromide*. **Synthetic cholinergic blocking agents:** Tropicamide, Cyclopentolate hydrochloride, Clidinium bromide, Dicyclomine hydrochloride*, Glycopyrrolate, Methantheline bromide, Propantheline bromide, Benztropine mesylate, Orphenadrine citrate, Biperidine hydrochloride, Procyclidine hydrochloride*, Tridihexethyl chloride, Isopropamide iodide, Ethopropazine hydrochloride.		
4	**Drugs acting on Central Nervous System** **A. Sedatives and Hypnotics:** **Benzodiazepines:** SAR of Benzodiazepines, Chlordiazepoxide, Diazepam*, Oxazepam, Chlorazepate, Lorazepam, Alprazolam, Zolpidem **Barbiturtes:** SAR of barbiturates, Barbital*, Phenobarbital, Mephobarbital, Amobarbital, Butabarbital, Pentobarbital, Secobarbital **Miscelleneous:** **Amides & imides:** Glutethmide. **Alcohol & their carbamate derivatives:** Meprobomate, Ethchlorvynol. **Aldehyde & their derivatives:** Triclofos sodium, Paraldehyde. **B. Antipsychotics** **Phenothiazeines:** SAR of Phenothiazeines - Promazine hydrochloride, Chlorpromazine hydrochloride*, Triflupromazine, Thioridazine hydrochloride, Piperacetazine hydrochloride, Prochlorperazine maleate, Trifluoperazine hydrochloride. **Ring Analogues of Phenothiazeines:** Chlorprothixene, Thiothixene, Loxapine succinate, Clozapine. **Fluro buterophenones:** Haloperidol, Droperidol, Risperidone. **Beta amino ketones:** Molindone hydrochloride. **Benzamides:** Sulpieride. **C. Anticonvulsants:** SAR of Anticonvulsants, mechanism of anticonvulsant action	08 Hours	17.78%

Sr. No.	Unit	Hours	Weightage (%)
	Barbiturates: Phenobarbitone, Methabarbital. **Hydantoins:** Phenytoin*, Mephenytoin, Ethotoin **Oxazolidine diones:** Trimethadione, Paramethadione **Succinimides:** Phensuximide, Methsuximide, Ethosuximide* **Urea and monoacylureas:** Phenacemide, Carbamazepine* **Benzodiazepines:** Clonazepam **Miscellaneous:** Primidone, Valproic acid, Gabapentin, Felbamate		
5	**Drugs acting on Central Nervous System** **General anesthetics:** **Inhalation anesthetics:** Halothane*, Methoxyflurane, Enflurane, Sevoflurane, Isoflurane, Desflurane. **Ultra-short acting barbitutrates:** Methohexital sodium*, Thiamylal sodium, Thiopental sodium. **Dissociative anesthetics:** Ketamine hydrochloride.* **Narcotic and non-narcotic analgesics** **Morphine and related drugs:** SAR of Morphine analogues, Morphine sulphate, Codeine, Meperidine hydrochloride, Anilerdine hydrochloride, Diphenoxylate hydrochloride, Loperamide hydrochloride, Fentanyl citrate*, Methadone hydrochloride*, Propoxyphene hydrochloride, Pentazocine, Levorphanol tartarate. **Narcotic antagonists:** Nalorphine hydrochloride, Levallorphan tartarate, Naloxone hydrochloride. **Anti-inflammatory agents:** Sodium salicylate, Aspirin, Mefenamic acid*, Meclofenamate, Indomethacin, Sulindac, Tolmetin, Zomepriac, Diclofenac, Ketorolac, Ibuprofen*, Naproxen, Piroxicam, Phenacetin, Acetaminophen, Antipyrine, Phenylbutazone.	07 Hours	15.55%

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Subject Code: BP402P	Subject Title: Medicinal Chemistry – I (Practical)
Pre-requisite: --	

Teaching Scheme (Hours per week)		Evaluation Scheme (Marks)			
		Theory			Total
Practical	Credit	University Assessment	Continuous Assessment	Internal Assessment	
4	2	35	5	10	50

List of practical:

Sr. No.	Title of the Experiments
I	**Preparation of drugs/ intermediates**
1	1,3-pyrazole
2	1,3-oxazole
3	Benzimidazole
4	Benztriazole
5	2,3- diphenyl quinoxaline
6	Benzocaine
7	Phenytoin
8	Phenothiazine
9	Barbiturate
II	**Assay of drugs**
1	Chlorpromazine
2	Phenobarbitone
3	Atropine
4	Ibuprofen
5	Aspirin
6	Furosemide
III	**Determination of Partition coefficient for any two drugs**

Recommended Books (Latest Editions)

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia.
7. Organic Chemistry by I.L. Finar, Vol. II.
8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1-5.
9. Indian Pharmacopoeia.
10. Text book of practical organic chemistry- A.I.Vogel.

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Subject Code: BP403T	Subject Title: Physical Pharmaceutics-II (Theory)
Pre-requisite: --	

Scope: The course deals with the various physical and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

Course Objectives: Upon the completion of the course student shall be able to

1. Understand various physicochemical properties of drug molecules in the designing the dosage forms
2. Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations
3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

Teaching Scheme (Hours per week)			Evaluation Scheme (Marks)			
Lecture	Tutorial	Credit	Theory			Total
			University Assessment	Continuous Assessment	Internal Assessment	
3	1	4	75	10	15	100

Detailed Syllabus:

Sr. No.	Unit	Hours	Weightage (%)
1	**Colloidal dispersions:** Classification of dispersed systems & their general characteristics, size & shapes of colloidal particles, classification of colloids & comparative account of their general properties. Optical, kinetic & electrical properties. Effect of electrolytes, coacervation, peptization& protective action.	07 Hours	15.55%
2	**Rheology:** Newtonian systems, law of flow, kinematic viscosity, effect of temperature, non-Newtonian systems, pseudoplastic, dilatant, plastic, thixotropy, thixotropy in formulation, determination of viscosity, capillary, falling Sphere, rotational viscometers	10 Hours	22.22%

Sr. No.	Unit	Hours	Weightage (%)
	Deformation of solids: Plastic and elastic deformation, Heckel equation, Stress, Strain, Elastic Modulus		
3	**Coarse dispersion:** Suspension, interfacial properties of suspended particles, settling in suspensions, formulation of flocculated and deflocculated suspensions. Emulsions and theories of emulsification, microemulsion and multiple emulsions; Stability of emulsions, preservation of emulsions, rheological properties of emulsions and emulsion formulation by HLB method.	10 Hours	22.22%
4	**Micromeretics:** Particle size and distribution, mean particle size, number and weight distribution, particle number, methods for determining particle size by different methods, counting and separation method, particle shape, specific surface, methods for determining surface area, permeability, adsorption, derived properties of powders, porosity, packing arrangement, densities, bulkiness & flow properties.	10 Hours	22.22%
5	**Drug stability:** Reaction kinetics: zero, pseudo-zero, first & second order, units of basic rate constants, determination of reaction order. Physical and chemical factors influencing the chemical degradation of pharmaceutical product: temperature, solvent, ionic strength, dielectric constant, specific & general acid base catalysis, Simple numerical problems. Stabilization of medicinal agents against common reactions like hydrolysis & oxidation. Accelerated stability testing in expiration dating of pharmaceutical dosage forms. Photolytic degradation and its prevention	08 Hours	17.78%

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Subject Code: BP403P	Subject Title: Physical Pharmaceutics-II (Practical)
Pre-requisite: --	

Teaching Scheme (Hours per week)		Evaluation Scheme (Marks)			
Practical	Credit	Theory			Total
		University Assessment	Continuous Assessment	Internal Assessment	
4	2	35	5	10	50

List of practical:

Sr. No.	Title of the Experiments
1.	Determination of particle size, particle size distribution using sieving method
2.	Determination of particle size, particle size distribution using Microscopic method
3.	Determination of bulk density, true density and porosity
4.	Determine the angle of repose and influence of lubricant on angle of repose
5.	Determination of viscosity of liquid using Ostwald's viscometer
6.	Determination sedimentation volume with effect of different suspending agent
7.	Determination sedimentation volume with effect of different concentration of single suspending agent
8.	Determination of viscosity of semisolid by using Brookfield viscometer
9.	Determination of reaction rate constant first order.
10.	Determination of reaction rate constant second order
11.	Accelerated stability studies

Recommended Books (Latest Editions)

1. Physical Pharmacy by Alfred Martin, Sixth edition
2. Experimental pharmaceutics by Eugene, Parott.
3. Tutorial pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical calculations, Lea & Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, Marcel Dekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
7. Physical Pharmaceutics by Ramasamy C, and Manavalan R.

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Subject Code: BP404T	Subject Title: Pharmacology - I (Theory)
Pre-requisite: --	

Scope: The main purpose of the subject is to understand what drugs do to the living organisms and how their effects can be applied to therapeutics. The subject covers the information about the drugs like, mechanism of action, physiological and biochemical effects (pharmacodynamics) as well as absorption, distribution, metabolism and excretion (pharmacokinetics) along with the adverse effects, clinical uses, interactions, doses, contraindications and routes of administration of different classes of drugs.

Course Objectives: Upon the completion of this course student shall be able to

1. Understand the pharmacological actions of different categories of drugs
2. Explain the mechanism of drug action at organ system/sub cellular/macromolecular levels.
3. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
4. Observe the effect of drugs on animals by simulated experiments
5. Appreciate correlation of pharmacology with other bio medical sciences

Teaching Scheme (Hours per week)			Evaluation Scheme (Marks)			
			Theory			Total
Lecture	Tutorial	Credit	University Assessment	Continuous Assessment	Internal Assessment	
3	1	4	75	10	15	100

Detailed Syllabus:

Sr. No.	Unit	Hours	Weightage (%)
1	**General Pharmacology** a. Introduction to Pharmacology- Definition, historical landmarks and scope of pharmacology, nature and source of drugs, essential drugs concept and routes of drug administration, Agonists, Antagonists (competitive and non-competitive), spare receptors, addiction, tolerance, dependence, tachyphylaxis, idiosyncrasy, allergy. b. Pharmacokinetics- Membrane transport, absorption, distribution, metabolism and excretion of drugs. Enzyme induction, enzyme inhibition, kinetics of elimination.	08 Hours	17.78%

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Sr. No.	Unit	Hours	Weightage (%)
2	**General Pharmacology** a. Pharmacodynamics- Principles and mechanisms of drug action. Receptor theories and classification of receptors, regulation of receptors. drug receptors interactions signal transduction mechanisms, G-protein–coupled receptors, ion channel receptor, transmembrane enzyme linked receptors, transmembrane JAK-STAT binding receptor and receptors that regulate transcription factors, dose response relationship, therapeutic index, combined effects of drugs and factors modifying drug action. b. Adverse drug reactions. c. Drug interactions (pharmacokinetic and pharmacodynamic) d. Drug discovery and clinical evaluation of new drugs - Drug discovery phase, preclinical evaluation phase, clinical trial phase, phases of clinical trials and pharmacovigilance.	12 Hours	26.67%
3	**Pharmacology of drugs acting on peripheral nervous system** a. Organization and function of ANS. b. Neurohumoral transmission, co-transmission and classification of neurotransmitters. c. Parasympathomimetics, Parasympatholytics, Sympathomimetics, sympatholytics. d. Neuromuscular blocking agents and skeletal muscle relaxants (peripheral). e. Local anesthetic agents. f. Drugs used in myasthenia gravis and glaucoma	10 Hours	22.22%
4	**Pharmacology of drugs acting on central nervous system** a. Neurohumoral transmission in the C.N.S. special emphasis on importance of various neurotransmitters like with GABA, Glutamate, Glycine, serotonin, dopamine. b. General anesthetics and pre-anesthetics. c. Sedatives, hypnotics and centrally acting muscle relaxants. d. Anti-epileptics	08 Hours	17.78%

Sr. No.	Unit	Hours	Weightage (%)
	e. Alcohols and disulfiram		
5	**Pharmacology of drugs acting on central nervous system** a. Psychopharmacological agents: Antipsychotics, antidepressants, anti-anxiety agents, anti-manics and hallucinogens. b. Drugs used in Parkinsons disease and Alzheimer's disease. c. CNS stimulants and nootropics. d. Opioid analgesics and antagonists e. Drug addiction, drug abuse, tolerance and dependence.	07 Hours	15.555

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Subject Code: BP404P	Subject Title: Pharmacology - I (Practical)
Pre-requisite: --	

Teaching Scheme (Hours per week)		Evaluation Scheme (Marks)			
Practical	Credit	Theory			Total
		University Assessment	Continuous Assessment	Internal Assessment	
4	2	35	5	10	50

List of Practical:

Sr. No.	Title of the Experiments
1.	Introduction to experimental pharmacology.
2.	Commonly used instruments in experimental pharmacology.
3.	Study of common laboratory animals.
4.	Maintenance of laboratory animals as per CPCSEA guidelines.
5.	Common laboratory techniques. Blood withdrawal, serum and plasma separation, anesthetics and euthanasia used for animal studies.
6.	Study of different routes of drugs administration in mice/rats.
7.	Study of effect of hepatic microsomal enzyme inducers on the phenobarbitone sleeping time in mice.
8.	Effect of drugs on ciliary motility of frog oesophagus
9.	Effect of drugs on rabbit eye.
10.	Effects of skeletal muscle relaxants using rota-rod apparatus.
11.	Effect of drugs on locomotor activity using actophotometer.
12.	Anticonvulsant effect of drugs by MES and PTZ method.
13.	Study of stereotype and anti-catatonic activity of drugs on rats/mice.
14.	Study of anxiolytic activity of drugs using rats/mice.
15.	Study of local anesthetics by different methods

Note: All laboratory techniques and animal experiments are demonstrated by simulated experiments by softwares and video.

Recommended Books (Latest Editions)

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchil Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K.,

Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams &Wilkins

5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology
6. K.D.Tripathi. Essentials of Medical Pharmacology, JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
7. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher
8. Modern Pharmacology with Clinical Applications, by Charles R.Craig& Robert,
9. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.
10. Kulkarni SK. Handbook of experimental pharmacology. VallabhPrakashan.

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Subject Code: BP405T	Subject Title: Pharmacognosy and Phytochemistry - I (Theory)
Pre-requisite: --	

Scope: The subject involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties.

Course Objectives: Upon the completion of this course student shall be able to

1. To know the techniques in the cultivation and production of crude drugs
2. To know the crude drugs, their uses and chemical nature
3. Know the evaluation techniques for the herbal drugs
4. To carry out the microscopic and morphological evaluation of crude drugs

Teaching Scheme (Hours per week)			Evaluation Scheme (Marks)			
			Theory			Total
Lecture	Tutorial	Credit	University Assessment	Continuous Assessment	Internal Assessment	
3	1	4	75	10	15	100

Detailed Syllabus:

Sr. No.	Unit	Hours	Weightage (%)
1	**Introduction to Pharmacognosy:** (a) Definition, history, scope and development of Pharmacognosy (b) Sources of Drugs – Plants, Animals, Marine & Tissue culture (c) Organized drugs, unorganized drugs (dried latex, dried juices, dried extracts, gums and mucilages, oleoresins and oleo- gum -resins). **Classification of drugs:** Alphabetical, morphological, taxonomical, chemical, pharmacological, chemo and sero taxonomical classification of drugs **Quality control of Drugs of Natural Origin:** Adulteration of drugs of natural origin. Evaluation by organoleptic, microscopic, physical, chemical and biological methods and properties.	10 Hours	22.22%

Sr. No.	Unit	Hours	Weightage (%)
	Quantitative microscopy of crude drugs including lycopodium spore method, leaf constants, camera lucida and diagrams of microscopic objects to scale with camera lucida.		
2	**Cultivation, Collection, Processing and storage of drugs of natural origin:** Cultivation and Collection of drugs of natural origin Factors influencing cultivation of medicinal plants. Plant hormones and their applications. Polyploidy, mutation and hybridization with reference to medicinal plants	10 Hours	22.22%
3	**Plant tissue culture:** Historical development of plant tissue culture, types of cultures, Nutritional requirements, growth and their maintenance. Applications of plant tissue culture in pharmacognosy. Edible vaccines	07 Hours	15.55%
4	**Pharmacognosy in various systems of medicine:** Role of Pharmacognosy in allopathy and traditional systems of medicine namely, Ayurveda, Unani, Siddha, Homeopathy and Chinese systems of medicine. **Introduction to secondary metabolites:** Definition, classification, properties and test for identification of Alkaloids, Glycosides, Flavonoids, Tannins, Volatile oil and Resins	10 Hours	22.22%
5	Study of biological source, chemical nature and uses of drugs of natural origin containing following drugs **Plant Products:** Fibers - Cotton, Jute, Hemp Hallucinogens, Teratogens, Natural allergens **Primary metabolites:** General introduction, detailed study with respect to chemistry, sources, preparation, evaluation, preservation, storage, therapeutic used and commercial utility as Pharmaceutical Aids and/or Medicines for the following Primary metabolites: **Carbohydrates:** Acacia, Agar, Tragacanth, Honey	08 Hours	17.78%

Sr. No.	Unit	Hours	Weightage (%)
	Proteins and Enzymes: Gelatin, casein, proteolytic enzymes (Papain, bromelain, serratiopeptidase, urokinase, streptokinase, pepsin). **Lipids (Waxes, fats, fixed oils):** Castor oil, Chaulmoogra oil, Wool Fat, Bees Wax **Marine Drugs:** Novel medicinal agents from marine sources		

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Subject Code: BP405P	Subject Title: Pharmacognosy and Phytochemistry I (Practical)
Pre-requisite: --	

Teaching Scheme (Hours per week)		Evaluation Scheme (Marks)			
		Theory			Total
Practical	Credit	University Assessment	Continuous Assessment	Internal Assessment	
4	2	35	5	10	50

List of Practical:

Sr. No.	Title of the Experiments
1.	Analysis of crude drugs by chemical tests: (i)Tragaccanth (ii) Acacia (iii)Agar (iv) Gelatin (v) starch (vi) Honey (vii) Castor oil
2.	Determination of stomatal number and index
3.	Determination of vein islet number, vein islet termination and paliside ratio.
4.	Determination of size of starch grains, calcium oxalate crystals by eye piece micrometer
5.	Determination of Fiber length and width
6.	Determination of number of starch grains by Lycopodium spore method
7.	Determination of Ash value
8.	Determination of Extractive values of crude drugs
9.	Determination of moisture content of crude drugs
10.	Determination of swelling index and foaming

Recommended Books (Latest Editions)

1. W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Sounders & Co., London, 2009.
2. Tyler, V.E., Brady, L.R. and Robbers, J.E., Pharmacognosy, 9th Edn., Lea and Febiger, Philadelphia, 1988.
3. Text Book of Pharmacognosy by T.E. Wallis
4. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
5. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.
6. Herbal drug industry by R.D. Choudhary (1996), Ist Edn, Eastern Publisher, New Delhi.
7. Essentials of Pharmacognosy, Dr. S. H. Ansari, IInd edition, Birla publications, New Delhi, 2007
8. Practical Pharmacognosy: C.K. Kokate, Purohit, Gokhlae
9. Anatomy of Crude Drugs by M.A. Iyengar

Gandhinagar Institute of Pharmacy
Bachelor of Pharmacy (Undergraduate)
Semester 4

Subject Code: BP406T	Subject Title: Communication Skills (Theory)
Pre-requisite: --	

Course Objective: Upon completion of the course student shall be able to

1. Identify Basic communication skills (Verbal and Non-Verbal).
2. Learn Writing Skills, Interview Handling Skills, and Presentation Skills.
3. Understand the behavioral needs for a pharmacist to function effectively in the areas of pharmaceutical operation.
4. Effectively manage the team as a team player
5. Develop Leadership qualities and essentials.

Teaching Scheme (Hours per week)			Evaluation Scheme (Marks)			
			Theory			
Lecture	Tutorial	Credit	University Assessment	Continuous Assessment	Internal Assessment	Total
2	-	2	35	5	10	50

Detailed Syllabus:

Sr. No.	UNIT	Hours	Weightage (%)
1.	**Communication Skills, Barriers to communication, Perspectives in Communication.** Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context. Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional Barriers. Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment.	**7 Hours**	**23.33%**
2.	**Elements of Communication, Communication Styles:** Introduction, Face to Face Communication - Tone of Voice, Body Language (Non-verbal	**7 Hours**	**23.33%**

	communication), Verbal Communication, Physical Communication. Introduction, The Communication Styles Matrix with example for each - Direct Communication Style, Spirited Communication Style, Systematic Communication Style, Considerate Communication Style.		
3.	**Basic Listening Skills, Writing Effectively, Effective Written Communication** Introduction, Self-Awareness, Active Listening, becoming an Active Listener, Listening in Difficult Situations. Introduction, When and When Not to Use Written Communication - Complexity of the Topic, Amount of Discussion Required, Shades of Meaning, Formal Communication. Subject Lines, Put the Main Point First, Know Your Audience, Organization of the Message.	**7 Hours**	**23.33%**
4.	**Interview Skills, Giving Presentations** Purpose of an interview, Do‘s and Don’ts of an interview. Dealing with Fears, planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery.	**5 Hours**	**16.66%**
5.	**Group Discussion:** Introduction, Communication skills in group discussion, Do‘s and Don‘ts of group discussion.	**4 Hours**	**13.33%**

Gandhinagar Institute of Pharmacy
Bachelor of Pharmacy (Undergraduate)
Semester 4

Subject Code: BP406P	Subject Title: Communication skills (Practical)
Pre-requisite: --	

Course Objective: Upon completion of the course student shall be able to

1. Identify Basic communication skills.
2. Differentiate Consonant and Vowel Sounds.
3. Learn Writing Skills, Interview Handling Skills and Presentation Skills.

Teaching Scheme (Hours per week)		Evaluation Scheme (Marks)			
		Theory			
Practical	Credit	University Assessment	Continuous Assessment	Internal Assessment	Total
2	1	15	5	5	25

List of Practical:

Sr. No.	Title of the unit
1	Basic communication covering the following topics
	(a) Meeting People
	(b) Asking Questions
	(c) Making Friends
	(d) What did you do?
	(e) Do‘s and Don’ts
2	Pronunciations covering the following topics
	(a) Pronunciation (Consonant Sounds)
	(b) Pronunciation (Vowel Sounds)
3	Advanced Learning
	(a) Listening Comprehension / Direct and Indirect Speech
	(b) Figures of Speech
	(c) Effective Communication Writing Skills
	(d) Effective Writing
	(e) Interview Handling Skills
	(f) E-Mail etiquette
	(g) Presentation Skills

Recommended Study Material:

1. Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education,2011
2. Communication skills, Sanjay Kumar, Pushpalata, 1st Edition, Oxford Press, 2011
3. Organizational Behaviour, Stephen .P. Robbins, 1st Edition, Pearson, 2013
4. Brilliant- Communication skills, Gill Hasson, 1st Edition, Pearson Life, 2011
5. The Ace of Soft Skills: Attitude, Communication and Etiquette for success, Gopala
6. Swamy Ramesh, 5th Edition, Pearson, 2013 7. Developing your influencing skills, Deborah Dalley, LoisBurton, Margaret, Green Hall, 1st Edition Universe of Learning LTD, 2010
7. Communication skills for professionals, Konar nira, 2nd Edition, New arrivals
8. PHI, 2011 9. Personality development and soft skills, Barun K Mitra, 1st Edition, Oxford Press, 10. 2011
9. Soft skill for everyone, Butter Field, 1st Edition, Cengage Learning India pvt. ltd, 2011
10. Soft skills and professional communication, Francis Peters SJ, 1st Edition, Mc Graw 12. Hill Education,2011
11. Effective communication, John Adair, 4th Edition, Pan Mac Millan,2009
12. Bringing out the best in people, Aubrey Daniels, 2nd Edition, Mc Graw Hill, 1999