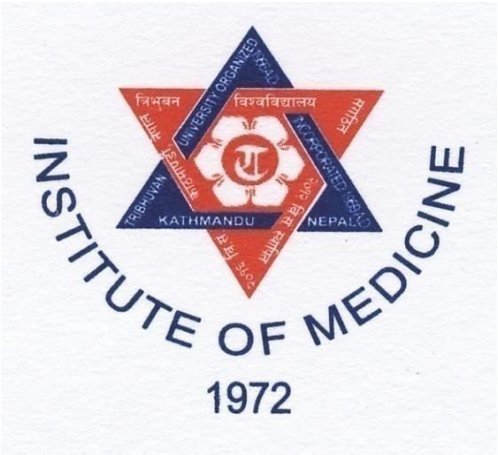
Curriculum

on

Bachelor in Pharmacy

(B. Pharm)



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The first year consists of six-theory papers and three practical carrying a total load of 990 Teaching Hours (46) including both theory and practical. In the second year, there are six theory papers and six-practical carrying a total load of 1080 Teaching Hours (48). In the third year, there are seven theory papers and three practical carrying a total load of 900 Teaching Hours (48) and in the fourth year there will be four theory and one practical paper carrying a total load of 450 Teaching Hours (36). The course consists of total of 3420 Teaching Hours (178). Apart from these papers, a 3 months' period is allotted to Dissertation and a 2 months time is allotted to the in-plant training in the fourth year.

10. Curriculum structure of Bachelor of Pharmacy

Code No.	Name of the subject	Hrs/ wk	Hrs/ yr	Credit	Marks
FIRST YEAR					
BP 401 A	Anatomy, Physiology & Pathology-Theory	3	90	6	100
BP 402 A	Biochemistry- Theory	3	90	6	100
BP 402 B	Biochemistry-Practical	3	90	2	50
BP 403 A	Pharmaceutical Chemistry-Theory	3	90	6	100
BP 403 B	Pharmaceutical Chemistry-Practical	3	90	2	50
BP 404 A	Medicinal Chemistry I-Theory	3	90	6	100
BP 405 A	Pharmacology I-Theory	3	90	6	100
BP 406 A	Pharmaceutical Microbiology-Theory	3	90	6	100
BP 406 B	Pharmaceutical Microbiology-Practical	3	90	2	50
	Total of First Year	**33**	**990**	**46**	**750**
SECOND YEAR					
BP 501 A	Pharmaceutics I (Physical Pharmacy)-Theory Pharmaceutics I (Physical Pharmacy)-	3	90	6	100
BP 501 B	Practical	3	90	2	50
BP 502 A	Medicinal Chemistry II-Theory	3	90	6	100
BP 502 B	Medicinal Chemistry II-Practical	3	90	2	50
BP 503 A BP 503 B	Biopharmaceutics and Pharmacokinetics- Theory Biopharmaceutics and Pharmacokinetics- Practical	3 3	90 90	6 2	100 50
BP 504 A	Pharmacognosy -Theory	3	90	6	100
BP 504 B	Pharmacognosy –Practical	3	90	2	50
BP 505 A	Pharmacology II-Theory	3	90	6	100
BP 505 B	Pharmacology II-Practical	3	90	2	50

BP 506 A	Pharmaceutical analysis and quality assurance I-Theory	3	90	6	100
BP 506 B	Pharmaceutical analysis and quality assurance I- Practical	3	90	2	50
	Total of Second Year	**36**	**1080**	**48**	**900**
THIRD YEAR					
BP 601 A	Pharmaceutical Engineering-Theory	3	90	6	100
BP 602 A	Pharmaceutics II (Dosage Forms and Formulation) -Theory	3	90	6	100
BP 602 B	Pharmaceutics II (Dosage Forms and Formulation)–Practical	3	90	2	50
BP 603 A	Pharmaceutical analysis and quality assurance II- Theory	3	90	6	100
BP 603 B	Pharmaceutical analysis and quality assurance II- Practical	3	90	2	50
BP 604 A	Ayurvedic and Herbal Technology-Theory	3	90	6	100
BP 604 B	Ayurvedic and Herbal Technology-Practical	3	90	2	50
BP 605 A	Biostatistics & Research Methodology-Theory	3	90	6	100
BP 606 A	Pharmaceutical Jurisprudence-Theory	3	90	6	100
BP 607 A	Community Pharmacy and First Aid-Theory	3	90	6	100
	Total of Third Year	**30**	**900**	**48**	**850**
FOURTH YEAR					
BP 701 A	Clinical and Hospital Pharmacy-Theory	3	90	6	100
BP 701 B	Clinical and Hospital Pharmacy-Practical	3	90	2	50
BP 702 A	Pharmaceutical Management-Theory	3	90	6	100
BP 703 A	Pharmaceutics III (Industrial Pharmacy) – Theory	3	90	6	100
BP 704 A	Pharmacotherapeutics-Theory	3	90	6	100
BP 705 DT	Dissertation			6	100
BP 706 IP	In-plant Training in Hospital +Industry (4 weeks each)			4	100
	Total of Fourth Year	**15**	**450**	**36**	**650**
	Grand Total	**114**	**3420**	**178**	**3150**

For the dissertation work, each student should develop a thesis topic, which will be carried out under the guidance of teachers. The students should submit a thesis and defend it.

Recognizing the need to develop the ability to translate theory into practice, students are placed for in-plant training in pharmaceutical manufacturing units, hospitals, drug stores as a part of curriculum at the begining of 4^{th} year.

PHARMACEUTICAL CHEMISTRY

Subject: Theory	Year: First	Code: BP 403 A
Full Marks: 100	Total Teaching hours: 90	Credit hour: 6

Course Description: This subject deals with the medicinal and pharmaceutical importance of inorganic compounds, methods of preparation and test of purity of these compounds. It also emphasizes on mechanisms and orientation of reactions in Organic chemistry.

General objectives:

At the end of this course, student will be able to

a. Discuss important medicinal uses of some common inorganic compounds and methods of preparation, test for purity, principle involved in the assay.

b. Explain different types of substitution, addition, elimination, oxidation and reduction reactions with mechanism.

c. Discuss stereochemical centers, stereochemistry and its importance in bioactivity of an organic compound.

Specific objectives:

Unit 1. Quality control and test for purity: [10Hrs]

After the completion of the course, students will be able to

a. Identify sources of impurities in pharmaceutical substances.
b. Understand definition, importance and general procedure for limit test for Chlorides, Sulphate, Iron and Lead.

Unit 2. Test for purity, Assay and Medicinal uses of Inorganic medicnal compounds [10 Hrs]

2.1. Gastrointestinal agents and related compounds

After the completion of the course, students will be able to

Discuss Test for purity, Assay and Medicinal uses of:

- **Acidifiers**: Ammonium chloride.
- **Antacids**: Aluminium hydroxide, Magnesium hydroxide, Light and heavy magnesium trisilicate.
- **Adsorbents and protectives:** Bismuth sub-carbonate.
- **Saline cathartics:** Magnesium sulphate

2.2. Topical Agents [6 Hrs]

After the completion of the course, students will be able to

Discuss Test for purity, Assay and Medicinal uses of

- **Astringents**: Alum and Zinc sulphate
- **Anti-microbials**: Hydrogen peroxide, Potassium permanganate, Chlorinated lime and Iodine,

2.3. Dental products [4 Hrs]

After the completion of the course, students will be able to
Discuss Test for purity, Assay and Medicinal uses of

- **Anti-caries Agents**: Sodium fluoride.
- **Dentifrices**: Calcium carbonate, Strontium chloride, and Zinc chloride.

2.4. Electrolytes used for replacement therapy:

After the completion of the course, students will be able to
Discuss test for purity, assay and medicinal uses of sodium chloride, potassium chloride, calcium gluconate and calcium lactate. **[5Hrs]**

2.5. Electrolytes used in the acid-base therapy:

After the completion of the course, students will be able to
Discuss Test for purity, Assay and Medicinal uses of Sodium bicarbonate, Sodium citrate, Sodium lactate, Sodium chloride injection and Oral rehydration salt.**[6 Hrs]**

2.6. Essential and Trace ions:

After the completion of the course, students will be able to
Discuss Test for purity, Assay and Medicinal uses of Ferrous fumarate, Ferrous gluconate and Ferric ammonium citrate. **[4 Hrs]**

Unit 3. Substitution reaction

After the completion of the course, students will be able to

a. StudyMechanism, kinetics, stereochemistry and evidences of SN_1 and SN_2 reactions.
b. Understand the role of solvent in substitution reactions and phase transfer catalysis.
c. Understand the mechanism of electrophilic aromatic substitution reaction with reference to nitration and sulphonation in benzene and it`s derivative.**[10Hrs]**

Unit 4. Elimination reaction:

After the completion of the course, students will be able to

a. Study theMechanism, kinetics and evidences of E_1 and E_2 reaction.
b. Discussion of isotope effect, the element effect, absence of hydrogen exchange and the absence of rearrangement.
c. Study the mechanism for dehydration of alcohols.**[8Hrs]**

Unit 5. Addition reaction:

After the completion of the course, students will be able to

a. Study the mechanism and rearrangement of electrophilic and free radical addition reaction mechanism in alkene.
b. Explain heat of hydrogenation and stability of alkenes
c. Classify Dienes
d. Study electrophilic addition to conjugated dienes (1,2 and 1,4 addition-rate versus equilibrium).**[8Hrs]**

Unit 6: Stereochemistry

After the completion of the course, students will be able to

a. Discussstereoisomerism, tetrahedral carbon, optical activity, enantiomers, diastereoisomers, meso structures, elements of symmetry, chirality and chiral centers.
b. Identify R and S configuration.
c. Explain racemic modification and resolution of racemic mixture.
d. Explain conformational isomers of ethane and n-butane.
e. Elaborate asymmetric synthesis, stereo-selective and stereo specific reactions with examples.
f. Study stereo chemical mechanisms for the addition of halogen to alkenes and single step elimination reaction. **[7 Hrs]**

Unit 7: Name Reactions:

After the completion of the course, students will be able to

a. Study the mechanism of Aldol condensation, Claisen condensation, Cannizzaro reaction, Benzoin condensation, Perkins's condensation, Knoevenagel reaction, Reformatsky reaction, Wittig's reaction, Michael's addition, Hoffman's rearrangement, Sandmeyer's reaction, Diazotisation and coupling reaction, Williamson's synthesis, Fries rearrangement reaction, Kolbe's reaction, Friedel craft reaction and Reimer Tieman's reaction**. [12Hrs]**

PHARMACEUTICAL CHEMISTRY

Subject: Practical	Year: First	Code: BP 403 A
Full Marks: 50	Total Teaching hours: 90	Credit hour: 2

At the end of the course, students will be able to

1. Identify functional groups of the different classes of organic compounds by systematic qualitative analysis including preparation of their derivatives.

2. Prepare derivatives of functional groups identified from 1 and determine their melting point.

3. Perform quantitative determination of organic compounds via functional groups.

a. Phenolic group by bromination method.
b. Alcoholic group by acetylation method.
c. Amino group by bromination method
d. Ester group by hydrolysis method
e. Amino acid by Formal titration method.

4. Perform l**imit tests**

a. Limit test for chlorides
b. Limit test for sulphate
c. Limit test for Iron
d. Limit test for Arsenic

5. Perform a**ssay of the following compounds**

a. Ferrous Sulphate – (Redox) Cerric Ammonium sulphate titration
b. Copper Sulphate - (Redox) Iodometry
c. Calcium gluconate -- complexometry
d. Hydrogen Peroxide – (Redox) Permanganometry
e. Sodium Chloride -- ModifiedVolhard's method

6. Perform estimation of the following mixtures

a Sodium Hydroxide and Sodium Carbonate mixture
b Oxalic acid and sodium oxalate

References: (Latest Editions)

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3. Beckett H, Stanlake J. B. Practical Pharmaceutical chemistry. Vol-I & II.
4. Finar I.L. Organic Chemistry. Vol. II ELBS/Longman, London.
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